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TABLE OF CONTENTS

PREFLIGHT

4 Next Great Flight
12 View From Above
14 Taking Off in Public
16 Point of View
18 Inbox
20 Ask *FLYING*
22 Chart Wise
24 I.L.A.F.F.T.
28 Aftermath
30 In Training
34 In Depth

On the cover
Leonardo Correa Luna caught the Bristell SLSA in his lens near Naples, Florida, and the Fairchild in Illinois (far left). Jim Stevenson joined up with the Mooney in Wisconsin (below).

Leonardo Correa Luna (2); Jim Stevenson

FLYING STORIES

46 We Fly: BRM Aero Bristell SLSA / *Julie Boatman*
56 Avionics for Your LSA / *Meg Godlewski*
60 *FLYING*'s Air Compare: Grumman AA-5 vs. Mooney M20 Series / *Jason McDowell*
70 Destinations: Capital Region / *Jonathan Welsh*
76 Maintaining Your Airplane: The Epitome of Cool / *Richard Scarbrough*
82 The One That Got Away: Fairchild 24 / *Leonardo Correa Luna*
90 Gaming To Keep the Dream Alive / *Sean Siff*

LIFE IN THE AIR

94 Taking Wing / *Sam Weigel*
96 Leading Edge / *Ben Younger*
98 Gear Up / *Dick Karl*
100 The Business of Aviation / *Dan Johnson*
104 Jumpseat / *Les Abend*
108 Unusual Attitudes / *Martha Lunken*
110 Technicalities / *Peter Garrison*
112 Sign Off

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BEHIND THE LENS

Jean-Marie Urlacher

AN EARLY MORNING in the Alps.

I've spent summers in Alaska—in fact, five summers flying a Piper Super Cub with big 35-inch tires landing in the bush, on rivers, and on glaciers. I fell in love with this mix of freedom, nature, and responsibility.

When I went back home to France, I wrote an article about the experience, and an Airbus test pilot who read the piece decided to become the French dealer for the CubCrafters Carbon Cub. Three years later, he came to my airport: Gap Tallard (LFNA), a beautiful airfield in the Alps where we have 300 sunny flying days each year.

With my good friends Nicolas Libis (an aerial firefighter pilot in the Canadair) flying the Carbon Cub and Tom Fitzgerald (a RedBull mechanic in the Extra) as my photoship pilot, we took off 30 minutes before sunrise and headed to a very special place—Altisurface Saint Étienne en Devoluy, a bush runway in the Alps tucked into the mountains near Super Devoluy alpine sports center, where there was a little wood cabin that we were caring for. For the two-hour flight, our little Alps transformed into a small Alaska—a dream come true!

Jean-Marie Urlacher

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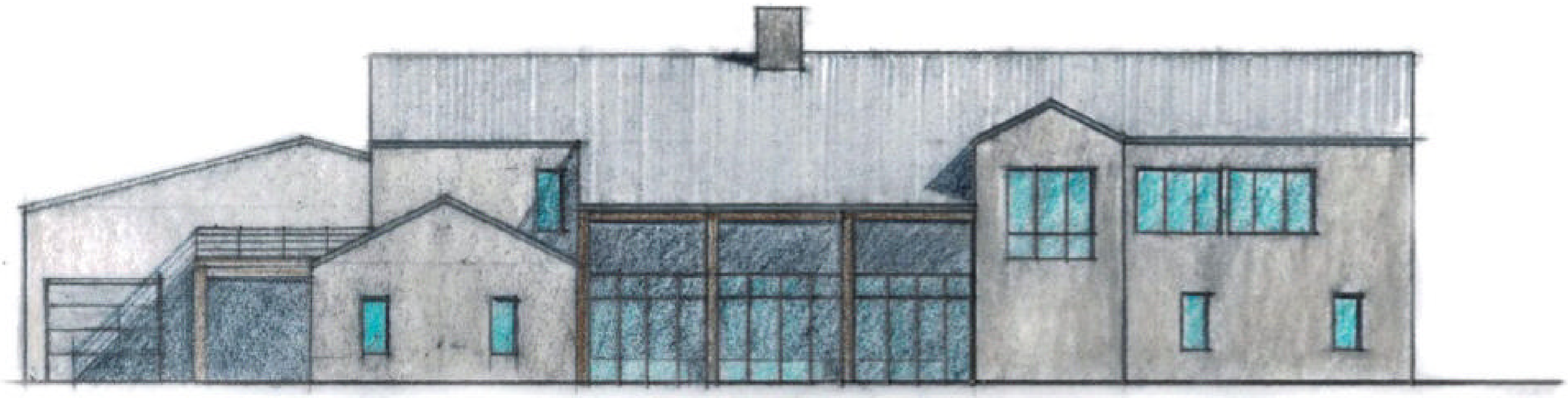

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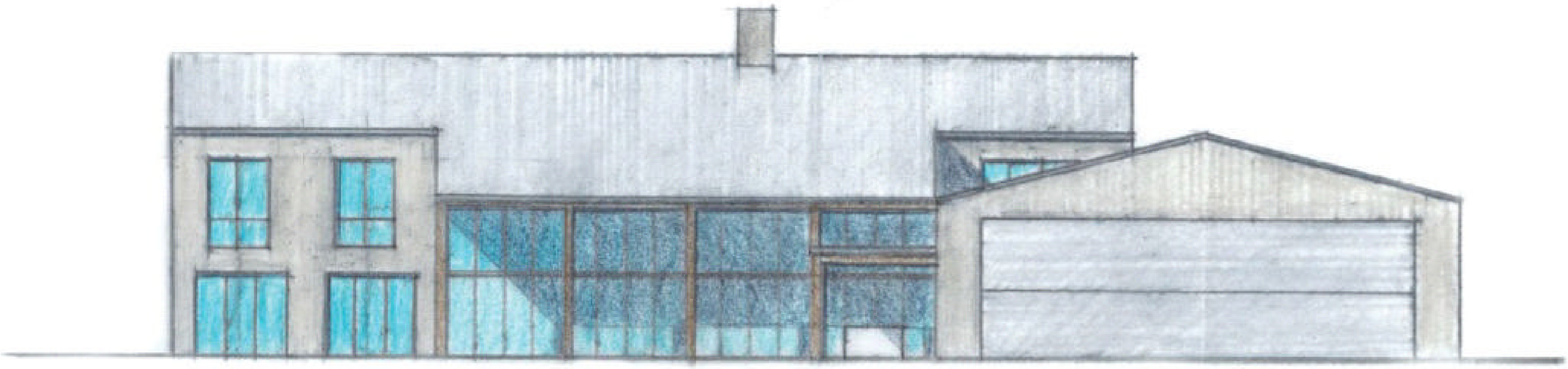

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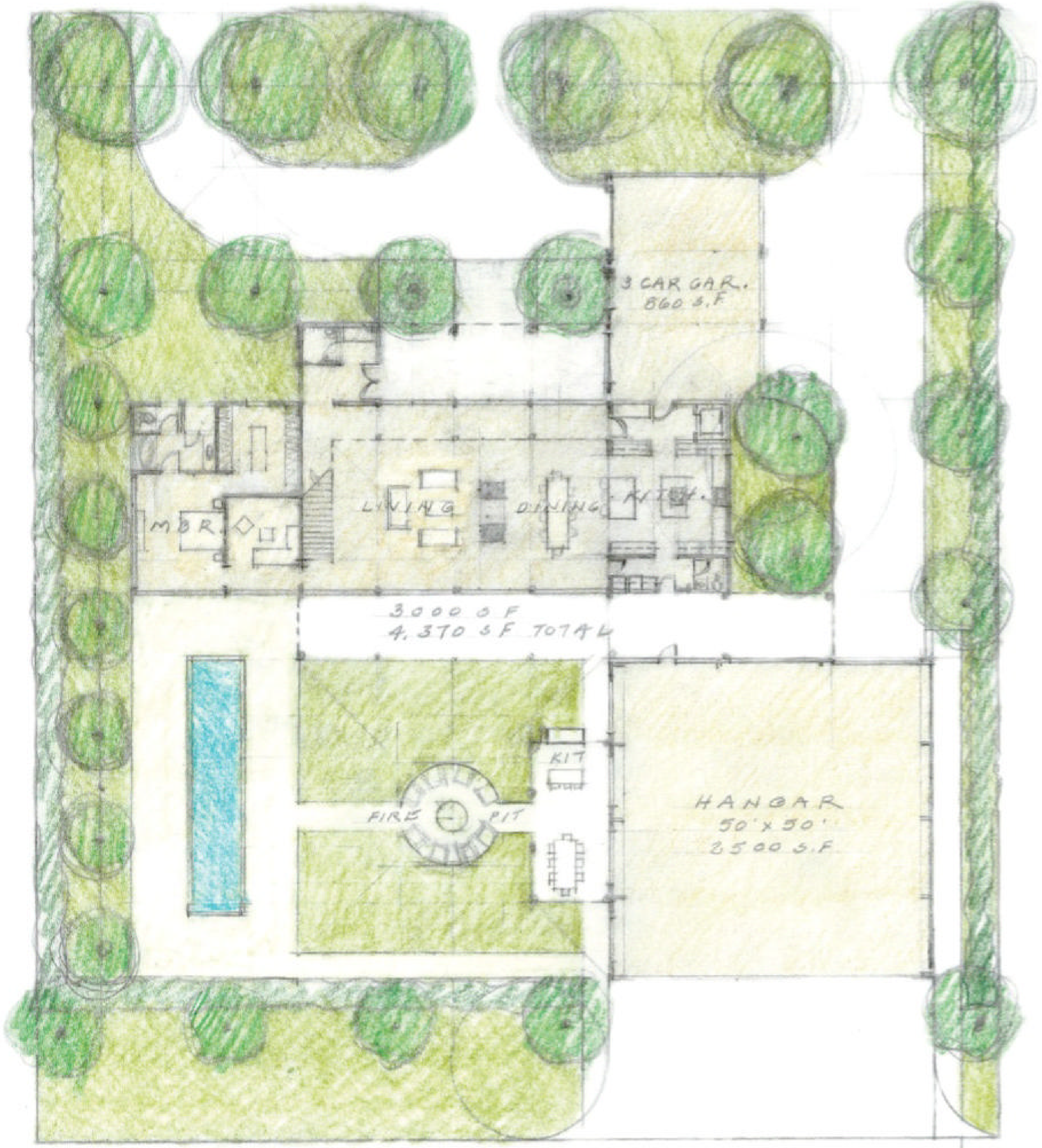
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AMY JO SLEDGE is an award-winning graphic designer. As the creative director for FLYING Media Group, she rebranded the design of the magazine into what it is today, using the vision she's brought from designing aviation and hospitality publications throughout her career. She comes from a family of pilots with her father, brother, and most recently her nephews joining the club. Amy Jo is honored to be part of the very talented crew that creates *FLYING* Magazine each month for all pilots to enjoy.

LEONARDO CORREA LUNA has been an airline pilot since he was 23. His first airliner to pilot was the Boeing 737-200 Classic, and he's now a captain on the Airbus A330, with 14,000 hours—and he's not counting anymore. He has experience in 41 different airplanes, mostly vintage and tailwheel. His favorite one—so far—is his 1952 Cessna 170B which he hangars in the Midwest U.S. He's been an aviation photographer (and occasional writer) for the past eight years.

RICHARD SCARBROUGH is a U.S. Navy veteran, A&P mechanic, and Embry-Riddle Aeronautical University graduate. His experience ranges from general and corporate aviation to helicopters, business jets, and commercial airliners. As the former owner of a Part 145 repair station, he's currently a program manager for a major airline and MRO, and a member of the T-C-Alliance. He contributes "Maintaining Your Airplane" to FLYING Digital.

THERESA PETRUSO has had a career in print production with beginnings in marketing, advertising, makeup, and fashion—but for 25-plus years she has worked for various aviation publications, and she's attended many conventions and airshows. From her childhood in New York City, she was intrigued by a neighbor who owned an aircraft and was a mechanic for Pan Am. Though she only has one flying lesson under her belt, she loves living next door to a private airport in Palm Beach County, Florida, watching small aircraft fly overhead.

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30 YEARS A CFI

Celebrating a personal milestone in the air.

APRIL MARKS AN aviation milestone that I approach with reverence: my 30th anniversary of obtaining my initial flight instructor certificate. It was a warm spring day in 1993 at the Boulder Municipal Airport (then 1V5, now the chuckle-inducing KBDU) in Colorado. I worked the desk and flight line at Dakota Ridge Aviation to help fund my progress, and I intercepted looks of commiseration from my coworkers when I told them I'd drawn Pete Shouldis as the FAA ops inspector delivering the practical test.

Shouldis' reputation led me to prepare for a long day—and it was one, but for good reason. The oral portion of the test began as a thorough and deliberate probing of my knowledge but turned into a happy exchange of ideas. He was tough but fair, so I felt good when we broke for lunch and I prepped for the flight portion scheduled in the afternoon. However, early-season Colorado thunderstorms popped up, causing us to discontinue the ride, which I would complete a couple of weeks later with another inspector, an affable fed who came from the airline side. He saw that my oral had been conducted by Shouldis and essentially said I had already passed the test.

Instructing remains among my favorite kinds of flying to this day.

When I flew recently with a friend in the industry who approaches his 25th anniversary as a CFI this year, we agreed that even though we no longer delivered instruction on a daily basis, we both enjoyed fully the rewards of being able to continue teaching when the opportunity presented itself. To let go of our precious CFI cards would be too much to bear, no matter the work we must go through to renew within our jam-packed schedules. And really, in the U.S. the burden isn't onerous. Under EASA, a flight instructor's renewal—including flight time—has more complex requirements.

For me, the rewards come in special hours flying with friends helping to fine-tune their skills, or introducing someone young or senior to a first taste of the sky.

Or, as happened recently, the chance to give a very special flight review. Oh yes, they earned that sign-off in the demonstration of their mastery of an airplane over more than one flight. You know who you are, and I'll never forget it. Thank you for the privilege.

While that pilot hardly missed a trick, a good instructor keeps confidential any weaknesses they encounter in order to help the pilot build skills back to where they should be. I once watched a chief instructor dress down in public a certificated pilot working on their commercial, for canceling a solo flight because of strong winds. I lost a lot of respect for the instructor that day for his lack of discretion. That's the wrong approach. It was an opportunity for learning, and he squandered it.

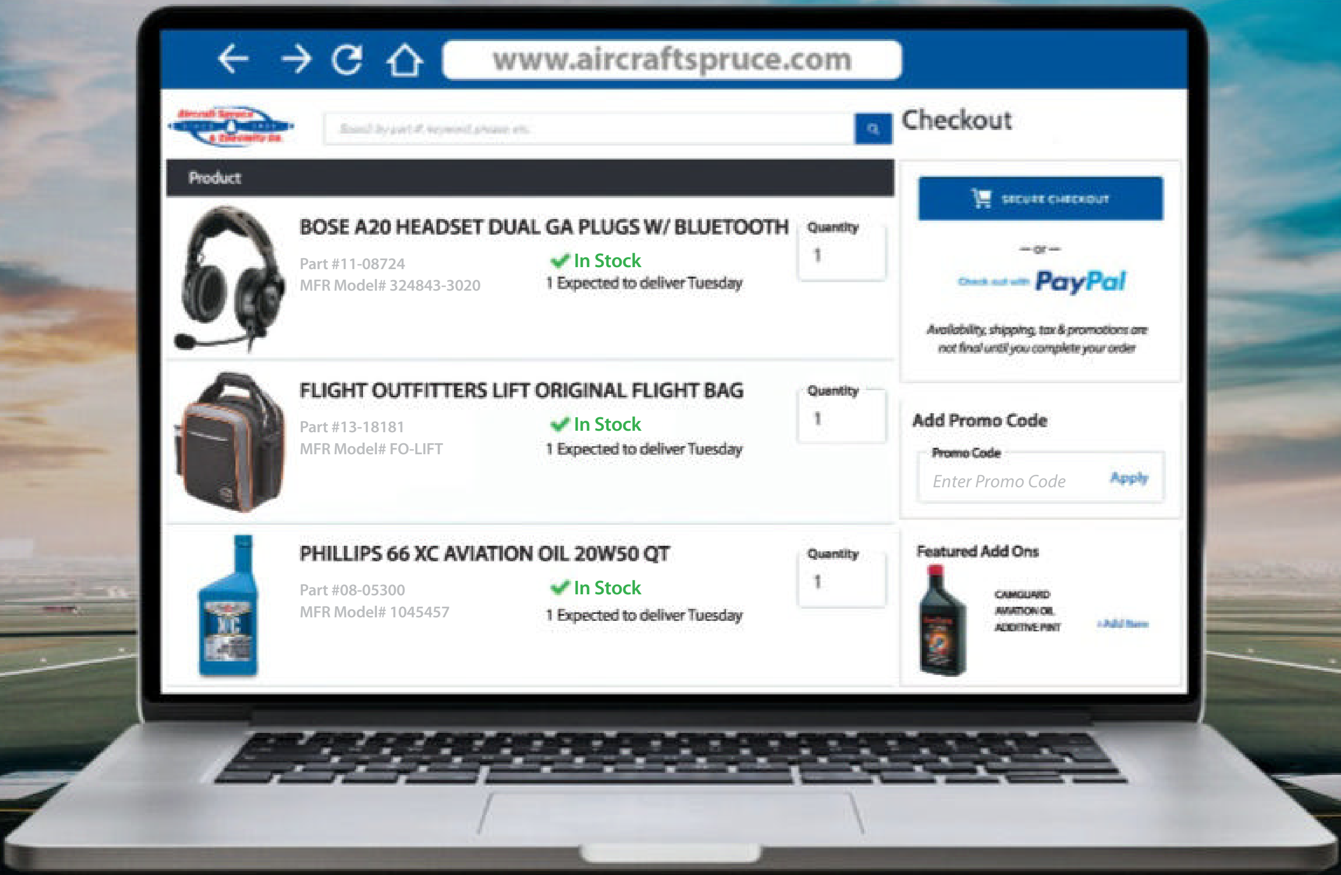
In this issue, we introduce two areas of coverage that are bound to teach you new things about aviation. First, we delve into the world of flight sim gaming for fun—not just for instructional purposes, though you're bound to learn a lot once you immerse yourself in this amazing world.

We also introduce deeper treatment of light sport aircraft, with my We Fly report on the Bristell SLSA, and LSA guru Dan Johnson's market report in the Business of Aviation column. Meg Godlewski, who approaches her twentieth year as a CFI, also looks at the path to upgrading SLSA avionics—as it's not like it is with a Part 23 certificated aircraft.

Join me in learning as I celebrate 30 years as a CFI—and have your favorite one take you out for a lesson.

Julie Boatman
Editor-in-Chief

● **JULIE BOATMAN** is a flight instructor with an airline transport pilot certificate and type ratings in the Cessna Citation Mustang and the Douglas DC-3—but she finds true happiness flying low and slow. Follow her on Twitter: @julieinthesky.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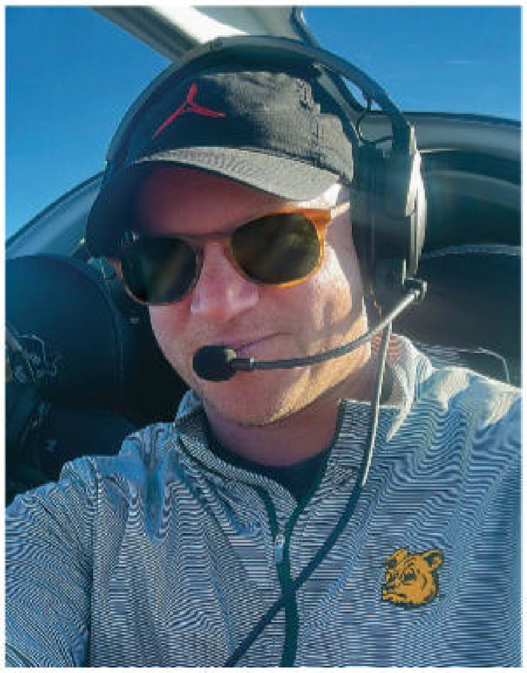

SPRING *FLYING*

As we fly into the airshow season, look for the magazine at an FBO near you.

BY CRAIG FULLER

WELCOME TO THE April edition of *FLYING*—Issue 936. It's springtime, and that kicks off my favorite time to be in the air. Living in East Tennessee means that we watch the mountains turn from the dull colors of winter to the green of budding leaves—and it's a perfect time to take my ICON through the Tennessee River Gorge.

Spring is also the start of the great general aviation shows, beginning with Sun 'n Fun Aerospace Expo in Lakeland, Florida, and climaxing with EAA AirVenture in Oshkosh, Wisconsin. This year, *FLYING* will have a large presence at both shows, so please come by and say hello.

At Sun 'n Fun, *FLYING* will make two major announcements—an acquisition of another media brand in the general aviation space and the launch of *Aircraft For Sale*, an online and print classified listings platform.

This is an important opportunity for *FLYING*, as it expands our coverage into the used aircraft market. We plan to bring a great deal to the used aircraft listings space, including providing pricing guides and intelligence on listings, and offering the deepest library of editorial content on the listings that is available. We are also reintroducing a newspaper-style used aircraft listings product that all *FLYING* subscribers will receive monthly with their subscription. Copies will also be sent to all FBOs in our network.

For anyone wanting to sell an aircraft, *Aircraft For Sale* will have the largest circulation of any aircraft listings product in the market. And for subscribers, *Aircraft For Sale* is covered by your subscription and will be 100 percent free.

Speaking of FBOs—you may have noticed recently that *FLYING* is now a regular feature at your FBO. We've devoted significant resources to get the monthly print edition back into FBOs across the U.S. One of the biggest developments? *FLYING* is now at Signature Flight Support outlets—what we understand to be the world's largest network of private aviation terminals. We've been told by the Signature team that manages distribution that *FLYING* is one of the most successful magazine titles they carry on their premium newsstands. We were excited to learn that issues of *FLYING* go very fast, with folks picking them up to read and take along, but we'd also recommend that you subscribe so you never miss an issue.

I would love to hear from you. You can reach me on Twitter @freightalley.

FLY
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How are we doing?

Stephen Yeates Photography

● **CRAIG FULLER** is CEO of *FLYING* Media Group and an active pilot of his ICON A5 and Tecnam Astore. Connect with Craig on Twitter: @freightalley.

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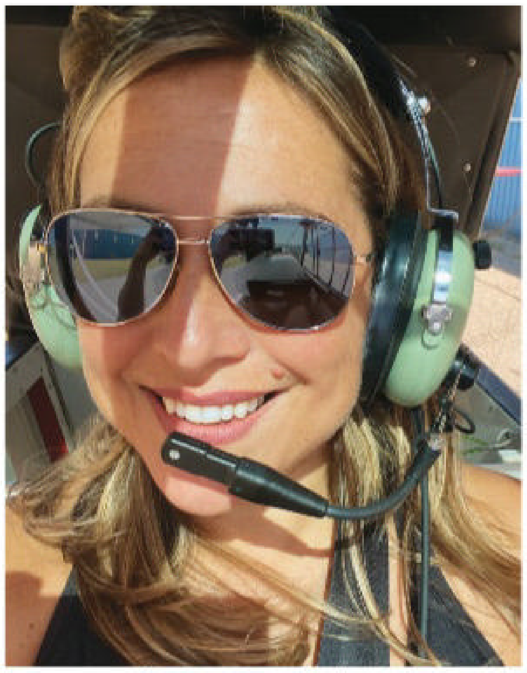

A SACRED PLACE

Honoring those who came before

BY LISA deFREES

IT'S A SACRED place, the one I've assumed as I take on the mantle of publisher of *FLYING* magazine. In a recent team discussion regarding street names for The Fields, our 1,500-acre fly-in community development in progress, it further deepened my appreciation for the legacy of those who have contributed to making *FLYING* what it is.

Since 1927, we have had extraordinary writers and publishers, from founding members of the U.S. military branches to legendary authors, creators of the commercial airline industry, pioneers developing aircraft technology, engines, and airframes, photographers, and the finest aviation storytellers. William Ziff, Robert Parke, Edward Muhlfeld, and Jay Durfee are a few of the publishers' names referred to in my early career meetings, idolized for their great work. I wished then that I could have known them. Now I think, "How can I emulate them?"

I have spent more than half my adult life with *FLYING,* starting in 1995 when the brand was led by J. Mac McClellan, editor-in-chief, and Dick Koenig, publisher, two professionals highly respected for their decades of dedication and hard work. I had a great mentor in Wayne Lincourt, our former associate publisher, and I was blessed to have the opportunity to get to know Richard Collins and Gordon Baxter while they were still alive. I would be remiss not to mention the sales legacy of the Van Gilders, Jim I and Jim II, whose advice and humor over the years have carried me through the challenges and successes.

Sir Isaac Newton said it best: "If I have seen further, it is by standing on the shoulders of giants." I believe this was his way of saying his success was not all his own. I can relate to this wholeheartedly. I take great responsibility for the role that has been bestowed upon me as we continue to transform and grow.

I have great confidence in our team of brilliant minds that bring it every day and honor the responsibility we have to give you the guidance you need to be the best and safest pilot possible. I have never felt less than part of the team because of our shared passion for the mission. The risks we take, the countless hours we work, the challenges all pilots face to earn the privilege of flight ensure we hold this in high regard—and that is what makes this community so sacred.

Have a story about how *FLYING* inspired you? We'd love to hear it. Email me: lisa@flying.media.

Courtesy of Lisa deFrees

Now-publisher Lisa deFrees at a corporate event with then-publisher Dick Koenig.

● **LISA deFREES,** publisher and chief commercial officer for FLYING Media Group, is a student pilot and 28-year member of the *FLYING* team. She resides in Chattanooga, Tennessee, with her French bulldog, Chuck Yeager.

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Insurance Alternative

Your February issue featured an article by Dick Karl about insurance problems triggered by his advancing age. He laments the threefold increase in his annual single pilot premium. My question is, "Where have you been, Dr. Karl?" We octogenarian pilots have faced this problem for the past few years. I have over 11,000 hours, about half in fighters and half in multiengine jets. Like Karl, I have the FAA Master Pilot Award and have been to recurrent training courses annually. (I also have the Distinguished Flying Cross, 10 Air Medals, and other assorted military decorations from a 20-year USAF career flying 89 different aircraft.) Does any of this impress the Insurance Industry? Not a chance.

At 85, I can recall the times when airline pilots were retired at age 60—despite being in perfect health. As my mentor in aerospace medicine at Harvard Medical School, Dr. Ross A. McFarland, cites in his seminal text, "Human Factors in Air Transport Design," when in doubt, err on the side of caution. The insurance companies have adopted this without variance. I am writing to assure Dr. Karl that there is a flying life—after absorbing this insult. I sold my Beechcraft 58 Baron two years ago, after 22 years of coast-to-coast flying while practicing cosmetic surgery and dermatology in Georgia. I built a [CubCrafters] Carbon Cub FX-2 in Yakima, Washington, and configured a Beechcraft V35B Bonanza with a glass cockpit and a digital autopilot. I can still get to the Midwest for pheasant hunts and the Bahamas for fishing...single pilot.

Florida has a number of EAA chapters where Karl might discover a whole new world of flying. He might get on his back and even pull a few Gs. My ex-fighter friends gave up their helmets, G-suits, and Mach 2-plus flights—and now fly Extras and the Pitts. An 88-year-old friend just bought a new gyrocopter he discovered at Oshkosh this year. My point? Dr. Karl doesn't need to feel "profoundly sad" when a world of enjoyable flying is still there for the taking.

William E. Barry, M.D.
Colonel, USAF, MC (Ret)
via email

Giveaway

[I] wanted to let you know that I have been an on-and-off subscriber for several years. Honestly, when you went to the quarterly edition and raised the subscription [price], I let mine lapse. It just seemed like too much money for me. Yes, the print quality is exceptional, and I'm a loyal reader of several of your contributors, but still, it's just a magazine, I figured. I still picked up your new issues when I could find them at my local airport. Now I must admit I did see you were going back to a monthly and lowered the price and was just about ready to resubscribe but was still kind of on the fence. Then, the latest issue announced giving away an ICON. You got me. I'm in! Just did a two-year subscription. I need it badly! Thank you.

Scott Herrema
via email

Great Service

First, I love the new format of the magazine with the rigid pages, bright bold pictures, and meaningful and timely articles and stories. My favorite part of the magazine, besides the stories, is the destinations part, where you show where and how to fly into different locations and give your travel experience. I don't own a turbine, so I'm most interested in ones where a piston can fly [into]. Also, I had an issue with my subscription, so I called customer service. I was connected with the nicest representative. She was pleasant and able to resolve my issue on the spot.

Ben Schulz
via email

Superheated Shortage

Just wanted to say how much I appreciated [Sam Weigel's] piece, "A Superheated Shortage." [February 2023/Issue 934] It was intelligent, engaging—with the voice of a wise sage. It was obvious the insights were hard-earned. It was fascinating for me as an outsider to the airline industry, something I considered being part of. [Weigel's] last paragraph was gracious, urging on the next generation to chase their dreams of flight.

Dan Philgreen
via email

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Is it possible to legally fly a Cessna 150 as a light sport aircraft? I have a sport pilot certificate. A friend has offered me his 1960s 150 with a 100 hp Continental O-200-A, and empty weight is about 1,100 pounds. If I take the passenger seat out and fly with partial fuel, it would be under the 1,320-pound weight limit.

The short answer is no, it is not legal to fly a Cessna 150 as a LSA, as the requirement for LSA is a maximum gross weight of no more than 1,320 pounds for land-based aircraft, or 1,430 if the aircraft is in the seaplane class. And by gross weight, this means the gross weight as listed on the type certificate when the aircraft rolled out of the factory, which for the 150 is 1,600 pounds.

You are not the first pilot to wonder about putting a two-place Cessna on a diet in an effort to fly it under light sport aircraft rules. Cessna 140 pilots have been pressing for a change or waiver to the regulations, as the certificated gross weight of that airplane is 1,450 pounds.

MEG GODLEWSKI has been an aviation journalist for more than 20 years and a CFI for more than 18 years. If she is not flying or teaching aviation, she is writing about it. She is a founding member of the Pilot Proficiency Center at EAA AirVenture.

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PINE BLUFF, ARKANSAS ILS LOC RWY 18

The approach into this non-towered rural airport is suprisingly complex at first glance.

BY JASON BLAIR

A PILOT WILL FIND the town of Pine Bluff in the heart of a rich agricultural area in the Arkansas River Basin south of Little Rock, Arkansas. While you might consider it a straightforward approach—with the non-towered airport's single runway (18/36) served by an ILS to Runway 18—the approach plate is a pretty busy one when you first take a look at it.

Ⓐ DME ARCS—THREE OF THEM

While some approaches will have a DME arc that a pilot may choose to use to establish onto an approach, this particular approach has three DME arcs. Three DME arcs?! Okay, one DME arc isn't that common anymore. Three of them on the same approach is downright rare. But you might choose one to establish yourself onto the approach. The one you choose depends on the direction you are coming toward the airport. They all start at the PBF VOR.

If you were coming from the south, you could transition from the PBF VOR onto the 022-degree radial for the teardrop-shaped DME arc 12.4 miles from the VOR, onto the inbound course of 178 degrees on the localizer.

Coming from the west, you might choose to go to the PBF VOR and then outbound on the 128-degree radial to IYTEL and fly the 8-mile DME arc with a left turn onto the inbound course.

Coming from the east, you might do the opposite and fly from the PBF VOR outbound on the 244-degree radial to the IYUNE IAF and fly right turns to the final approach fix while following the 8 DME arc. These two options don't require a procedure turn and allow the pilot to get established onto the approach without making hard turns. You could always navigate to any of the IAFs using the GPS, as well. Or get vectors from ATC when they are available.

Ⓑ DME ARC TO THE ILS

If you happen to be flying a DME arc using the PBF VOR, be sure to switch your navigation source over to the ILS/LOC when inbound. While the VOR is close to aligned with the inbound course, it isn't directly in alignment with the airport and isn't located on the field. A failure to switch navigation sources could have a pilot flying the "wrong line" toward the airport and result in being on an incorrect approach path.

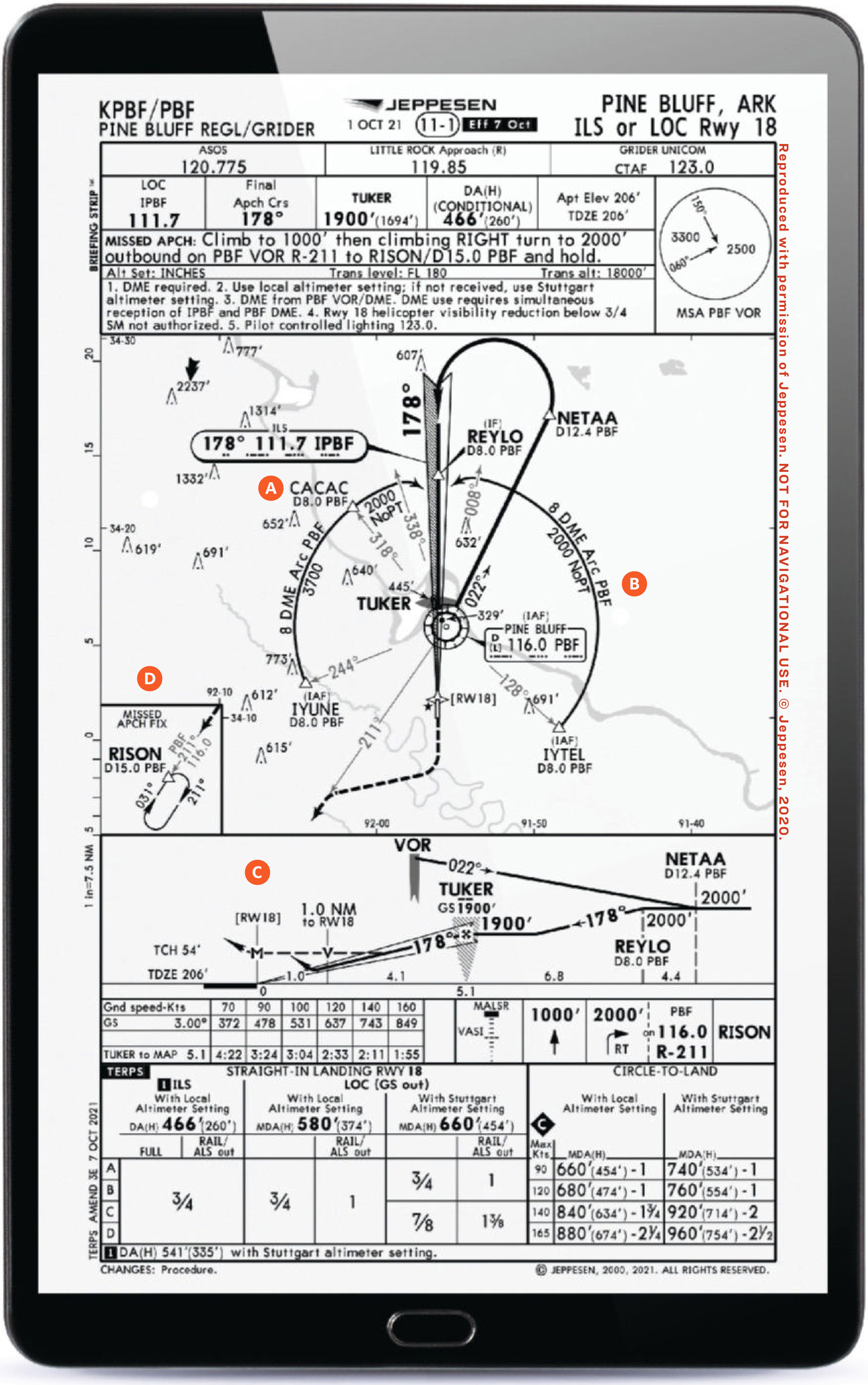
Ⓒ NO DME FOR THE MAPS

While you might be using DME on the ARC, there is no DME given for step-down points or missed approach points along the ILS/LOC course. You will need to identify the FAF at the TUKER OM and the missed approach point either using time (for a LOC approach) or at a decision height.

Ⓓ MISSED TRANSITION, ILS TO VOR

Going missed on this approach requires transitioning from navigating inbound on the ILS/LOC frequency to using the VOR. It also isn't a straight transition. It requires the pilot to make a right turn to intercept the 211 radial and then fly it outbound to the RISON intersection at 15 DME where a hold will begin. This might require the pilot to pay a little extra attention to intercepting the radial than just following it immediately outbound. A turn to something more than 211 degrees after going missed will be required to intercept that radial.

● **JASON BLAIR** is a flight instructor, an FAA examiner, and an author in the general aviation and training communities.



KPBF/PBF
PINE BLUFF REGL/GRIDER

JEPPESEN
1 OCT 21 (11-1) Eff 7 Oct

PINE BLUFF, ARK
ILS or LOC Rwy 18

ASOS	LITTLE ROCK Approach (R)	GRIDER UNICOM
120.775	119.85	CTAF 123.0

BRIEFING STRIP™

LOC IPBF	Final Apch Crs	TUKER	DA(H) (CONDITIONAL)	Apt Elev 206′ TDZE 206′
111.7	178°	1900′(1694′)	466′(260′)	

MISSED APCH: Climb to 1000′ then climbing RIGHT turn to 2000′ outbound on PBF VOR R-211 to RISON/D15.0 PBF and hold.

Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. DME required. 2. Use local altimeter setting; if not received, use Stuttgart altimeter setting. 3. DME from PBF VOR/DME. DME use requires simultaneous reception of IPBF and PBF DME. 4. Rwy 18 helicopter visibility reduction below 3/4 SM not authorized. 5. Pilot controlled lighting 123.0.

150°
3300
2500
060°
MSA PBF VOR
34-30
20
15
10
5
0
5
34-20
34-10
92-10
92-00
91-50
91-40
777′
2237′
1314′
ILS
178° 111.7 IPBF
1332′
A
CACAC
D8.0 PBF
652′
619′
691′
2000 NoPT
338°
318°
8 DME Arc PBF
3700
640′
445′
TUKER
607′
178°
(IF)
REYLO
D8.0 PBF
NETAA
D12.4 PBF
008°
632′
022°
8 DME 2000 NoPT Arc PBF
B
329′
(IAF)
PINE BLUFF
116.0 PBF
D
773′
244°
612′
(IAF)
IYUNE
D8.0 PBF
[RW18]
128°
691′
(IAF)
IYTEL
D8.0 PBF
211°
615′
MISSED APCH FIX
RISON
D15.0 PBF
PBF 211° 116.0
031°
211°
1 in=7.5 NM
C
VOR
022°
TUKER
GS 1900′
1900′
178°
NETAA
D12.4 PBF
2000′
2000′
REYLO
D8.0 PBF
[RW18]
1.0 NM to RW18
TCH 54′
TDZE 206′
M
V
178°
1.0
4.1
6.8
4.4
0
5.1

Gnd speed-Kts	70	90	100	120	140	160
GS 3.00°	372	478	531	637	743	849
TUKER to MAP 5.1	4:22	3:24	3:04	2:33	2:11	1:55

MALSR
VASI

1000′ ↑ 2000′ RT PBF on 116.0 R-211 RISON

TERPS STRAIGHT-IN LANDING RWY 18 — CIRCLE-TO-LAND

	ILS With Local Altimeter Setting DA(H) 466′(260′) FULL	ILS With Local Altimeter Setting DA(H) 466′(260′) RAIL/ALS out	LOC (GS out) With Local Altimeter Setting MDA(H) 580′(374′)	LOC (GS out) With Local Altimeter Setting MDA(H) 580′(374′) RAIL/ALS out	LOC (GS out) With Stuttgart Altimeter Setting MDA(H) 660′(454′)	LOC (GS out) With Stuttgart Altimeter Setting MDA(H) 660′(454′) RAIL/ALS out	Max Kts	Circle-to-land With Local Altimeter Setting MDA(H)	Circle-to-land With Stuttgart Altimeter Setting MDA(H)
A	3/4		3/4	1	3/4	1	90	660′(454′)-1	740′(534′)-1
B							120	680′(474′)-1	760′(554′)-1
C					7/8	1⅜	140	840′(634′)-1¾	920′(714′)-2
D							165	880′(674′)-2¼	960′(754′)-2½

DA(H) 541′(335′) with Stuttgart altimeter setting.

TERPS AMEND 3E 7 OCT 2021

CHANGES: Procedure.

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Joel Kimmel

ICED-UP MOONEY

Don't let Center intimidate you when you need to escape.

BY JOHN FOLK

IT WAS YOUR TYPICAL winter day in the Chicago area, cold with the ceiling around 500 feet agl. My wife and daughters were driving to New Jersey to visit family, so this was an awesome excuse for me to fly my Mooney Ovation2 GX—the first one out of the factory with the Garmin G1000 in late 2004—to the east coast and introduce our Brazilian foreign exchange student to his first flight in a small airplane.

I checked weather en route, and it looked okay, with no icing reported along our intended route as I planned my departure from the Aurora, Illinois, airport (KARR). After a thorough preflight inspection, we hopped in the airplane, fired it up, picked up our instrument clearance, contacted ground, and taxied out to the runway.

Tower cleared us for departure, and we initially climbed to 3,000 feet msl. We contacted Chicago Center and were cleared to 11,000 feet for our cruise altitude.

Above the clouds, it was sunny and calm, and our exchange student—never having flown in a small airplane before—was awed by the experience.

Things were progressing along just fine until we reached eastern Ohio, when I noticed the cloud tops beginning to rise. I asked Cleveland Center for a clearance to 15,000 feet so we could continue to enjoy the smooth ride. We donned our oxygen masks and began our climb.

As we ascended to 15,000, it became obvious that we were flying into an area where the cloud tops were ap-

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> “My airspeed started decreasing, and I couldn’t believe how quickly ice accumulated.”

proaching 15,000 and higher. I requested a climb to 17,000 feet, figuring I could stay out of the clouds and hopefully get close enough to the Morristown Airport (KMMU) to descend quickly through the layers. But I was wrong...that’s when the trouble began.

As soon as we reached 17,000 feet, we started clipping through the cloud tops—and that’s when the “Ice Man Cometh”—or “cameth” in our case.

I had never encountered icing before. The windshield iced over almost immediately, along with the wings. My airspeed started decreasing, and I couldn’t believe how quickly ice accumulated.

At this point, I knew we were in trouble. It was like my worst nightmare. I thought, this can’t be happening!

Execute a Plan

My thoughts immediately went back to my training and the admonition from instructors to never panic. And to execute a plan immediately. I let Center know we were picking up ice and needed an immediate descent to a lower altitude, hoping to find warmer air layers and stop the ice accumulation.

Center responded with, ”Mooney, maintain 17,000; you have a Dash 8 commuter underneath you.”

I replied, “Move the Dash 8—I’m descending now.”

Center cleared us down to 9,000 feet, where I leveled off between layers. At this point, we were still carrying the ice load, but the airplane was flying. We stayed at 9,000 feet until Center cleared us to 3,500 feet—and that’s when the banging started. It startled us at first, but it quickly became obvious that the noise came from the ice melting and breaking away—and hitting the airplane. We contacted the tower and were cleared for a VFR approach into Morristown. We landed without incident.

As I taxied up to the terminal, my wife and kids were waiting for us. I parked and opened my door and noticed a chunk of ice on the entry step. The cowling still had ice accumulated on the intake openings—a sight to behold.

Never Panic

So, what did I learn from this experience?

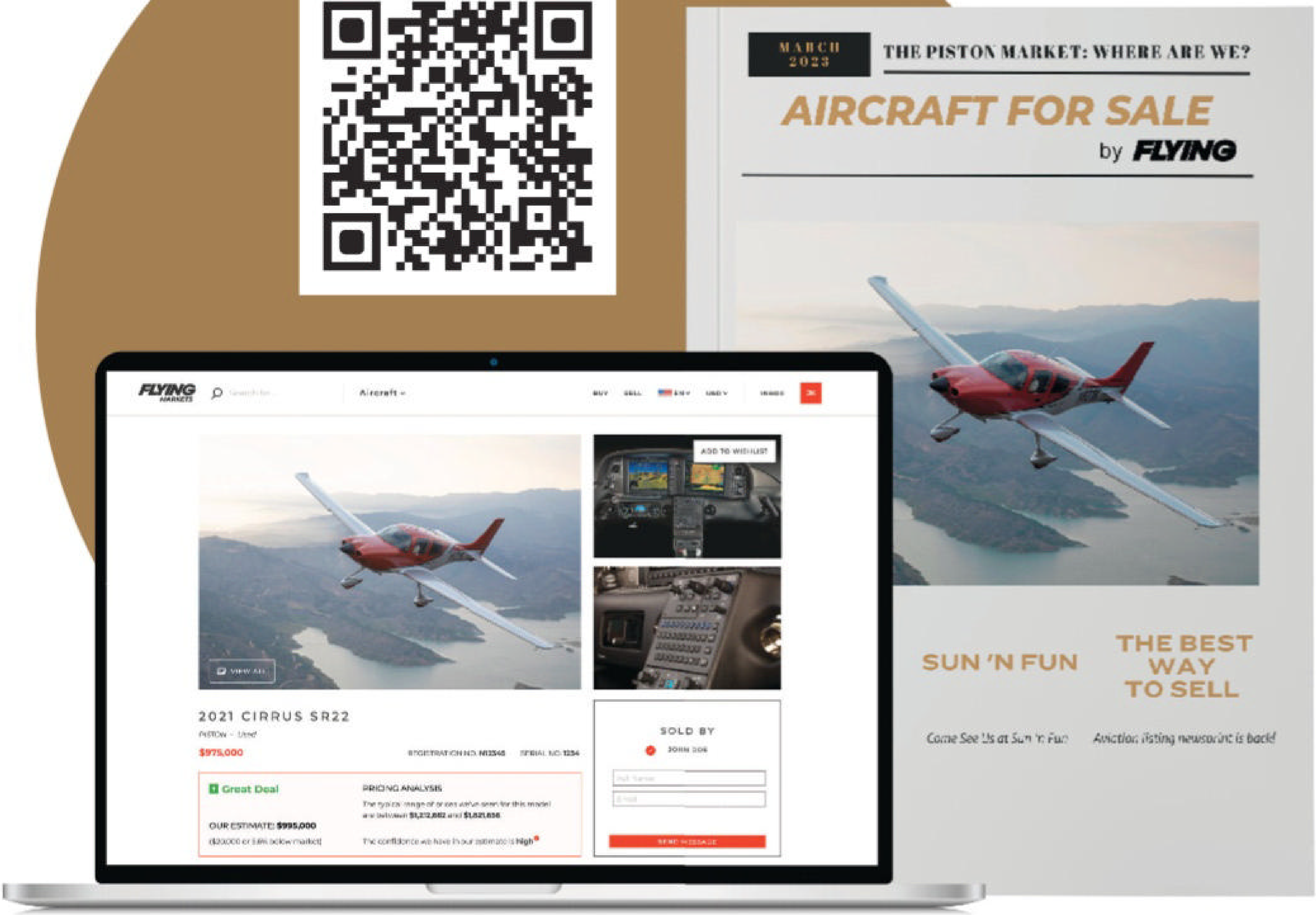
Never panic. Do not become complacent or let yourself be intimidated by ATC (in my case, Center). Act without delay, and do whatever you must to keep you and your passenger(s) safe.

Also, I could have done a better job analyzing the weather along my route.

Even though there were no en route icing reports at my filed altitude, I was not aware that the tops of clouds are generally laden with the most moisture and, at higher altitudes, that ice will form and accumulate very quickly on cold surfaces. Climbing to try to stay above the clouds and ice probably was the wrong decision.

Also, there are upgrades you can make to your airplane to help buy time. The Mooney and I returned to the Mooney Aircraft factory at Kerrville, Texas, later that month, where we had a TKS anti-icing system installed. ●

JOHN FOLK is a private pilot who holds instrument and multiengine ratings. He has accumulated more than 3,000 hours of flight time.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A HARMLESS PRANK

A long-ago incident nearly takes down an American Airlines Douglas DC-4.

BY PETER GARRISON

AMERICAN AIRLINES FLIGHT 311 departed New York on the evening of October 7, 1947, bound for Dallas and Los Angeles. Three pilots, all qualified captains, were aboard. The airplane was a Douglas DC-4 Skymaster, military designation C-54, the first of the series of four-radial-engine Douglas transports that ended with the DC-7. With a wingspan of 117 feet and room for as many as 80 passengers, it was a big airplane for its time. Unlike later models, however, it was not pressurized.

After the stop in Dallas, the airplane took off a little before dawn and climbed to its cruising altitude of 8,000 feet msl, or about 4,000 feet above ground level. Captain Charles Sisto was in the left seat, but after leveling off he relinquished it to Captain John Beck, who had come along to familiarize himself with the DC-4. In the right seat was Captain Melvin Logan, flying as copilot. Captain Sisto now took the jumpseat, which was behind and between the two pilots' seats.

Almost two hours after takeoff, a little west of El Paso, Beck noticed that the airplane had begun to climb. He rolled in some nose-down trim, but the climb persisted. He rolled in more trim, and, to his surprise, the rate of climb increased. Puzzled by the failure of pitch trim to produce the expected result, he turned to Sisto and asked him whether the automatic pilot was on. Sisto replied that it was not. Beck then considered the possibility that the gust lock, which was actuated from inside the airplane, had inadvertently become engaged. He began to roll the trim back to its neutral position, but before he could do so, the airplane pitched violently downward.

Beck and Sisto, who did not have their seat belts fastened, were thrown to the cockpit ceiling. On their way up, one of them accidentally struck the prop controls, feathering both propellers on the left side of the airplane and the outboard one on the right. Logan, whose belt was fastened and held him in his seat, perceived that the

Public Domain

airplane had performed a half outside loop and was now flying inverted a few hundred feet above the ground. He half-rolled it to the left—aided by the functioning number 3 engine—unfeathered the other propellers, turned around and headed for El Paso, where the airplane landed uneventfully 15 minutes later. Remarkably, while 30 of 49 passengers and five of the six crew received minor injuries from being thrown around, no one was seriously hurt.

In initial statements made the following day to the Civil Aeronautics Board, which investigated the bizarre incident (the National Transportation Safety Board did not yet exist), the three pilots said that the autopilot had been engaged just before the upset. CAB investigators accordingly examined the autopilot on the ground, and, finding nothing wrong with it, bravely took the airplane up for a test flight. No malfunction or evidence of demonic possession was found in the autopilot or any other part of the airplane.

A week later, the pilots, presumably having worked out what happened among themselves, withdrew their previous testimony. It now appeared that the autopilot had not been in use at all. What had happened was that Sisto, perhaps intending to test the alertness of Beck or maybe just because he was fun-loving, had silently engaged the elevator gust lock. After Beck asked him whether the autopilot was engaged, but before Beck had time to neutralize the trim, Sisto released the lock. The elevator trim tabs, still deflected upward, forced the elevators down, and the airplane tucked. The accidental feathering of the propellers, which removed thrust from three engines, was fortuitous—the CAB was of the opinion that if the engines had all continued to deliver cruising power, the airplane would certainly have struck the ground.

The mechanics of what happened are straightforward but maybe not obvious except in retrospect. The unexpected initial climb was probably a random effect of the engagement of the gust lock, which must have slightly changed the elevator incidence. When Beck trimmed the airplane nose down, the elevator trim tabs deflected upward. Normally, the tabs would push the elevators downward, but with the elevators locked, the tabs became ersatz elevators and pushed the entire tail down instead, causing the airplane to climb. Releasing the control lock restored the normal function of the tabs, which were now trimmed for a steep dive. It was perhaps thanks to the period of climbing before the upset, as well as to the accidentally feathered props, that the airplane avoided hitting the ground. Finally, the same powerful nose-down pitch trim that caused the bunt in the first place held the airplane's nose up when it was inverted, and gave Logan time to assess the situation and see the way out of it.

The CAB's report does not mention Beck pushing the controls forward to arrest the climb, but probably when he asked Sisto whether the autopilot was engaged it was because he had tried to apply a nose-down correction and found that he could not move the wheel. When Sisto said that the autopilot was not on, Beck's thoughts turned next to the gust lock. We don't know whether he visually checked the gust lock handle, but we do know that he realized that if the gust lock were engaged, he would have to neutralize the pitch trim before disengaging it.

The airplane had performed a half outside loop and was now flying inverted...

Evidently, the same thought did not occur to Sisto.

This bizarre incident occurred before airplanes carried flight data recorders, and the reconstruction of the accident was based on the testimony of the pilots. The CAB commended Logan for "his immediate recognition of the situation and for taking proper corrective action so promptly." Beck emerged blameless. However, the misadventure ended the airline career of Charles Sisto. In a decision handed down a year after the incident, the CAB found that he had "demonstrated a disregard for the principles of air safety [and] lacked the discretion and good judgment necessary for the holder of an airman certificate with an airline transport pilot or commercial rating..." Sisto's commercial certificate was revoked, but he eventually regained his private one. My friend and fellow scribbler Peter Lert, who called my attention to this curious story, heard it from Sisto himself sometime in the 1970s, when Sisto had a hangar at Santa Paula in southern California.

It's a rare Aftermath that ends without at least one fatality. I'm not sure what edifying lessons can be drawn from this story, but I thought it was too good to leave untold. And it does equip us with a bit of aviation trivia that may come in handy on some rainy afternoon in a hangar. Q: How much space does a DC-4 require for a diving outside loop? A: Less than 4,000 feet. ●

This article is based on the Civil Aeronautics Board's report of the incident and is intended to bring the issues raised to our readers' attention. It is not intended to judge or to reach any definitive conclusions about the ability or capacity of any person, living or dead, or any aircraft or accessory.

PETER GARRISON taught himself to use a slide rule and tin snips, built an airplane in his backyard, and flew it to Japan. He writes a monthly installment of Aftermath for *FLYING* online as well. He has contributed to *FLYING* since 1968.

FOR THE LOVE OF THE GAME

The creators weigh in on designing the world of virtual aviation.

BY MEG GODLEWSKI

AT AIRVENTURE 2001, *Microsoft Flight Simulator 2002* premiered. The company had a large presence at the show—they had a kiosk in an exhibit hangar and had rented a large trailer with an awning where they set up computers so that members of the media could test-fly the game.

The audience for the virtual aviation experience—I hesitate to call it a 'game,' and more on that later—was both aviation enthusiasts and certified pilots, as MSFS 2002 had been developed to be "as realistic as possible." I promptly tested this assertion by rolling a virtual Cessna 172 inverted and keeping it there. As the fuel tanks on the 172 are in the wings and the aircraft has a gravity-fed system, going upside down means the fuel doesn't reach the engine. In real life, you expect it to stop—and quickly. I silently counted alligators as I held the aircraft inverted—there was the sputter and cough as the engine quit approximately 15 seconds into the maneuver.

The MSFS representative looked awfully proud as he told me that the development team included pilots who took great pride in crafting this realistic virtual aviation experience.

Kit Warfield was one of these pilots. It is Kit's voice you heard on your virtual check ride. Now a retired commercial seaplane pilot from the Seattle area, Warfield was the content lead on *Microsoft Flight Simulator*

X-Plane

2000, 2002, 2004, Flight Sim X, and all three versions of *Combat Flight Simulator.*

"The tagline at the time was 'as real as it gets,' and we took great pride in trying to replicate the aircraft aerodynamics, the weather, and the scenery and so forth," she says. "To call it a game seemed to trivialize that, but officially and formally, the category that Microsoft Flight Simulator fits into is a game, as it is entertainment software."

The Fun and Fantasy Factor

Simulation games allow you to fly anywhere in the world in a variety of airframes—from gliders to commercial jets—and you can do silly things that you would never, ever do IRL, such as landing a 172 on the deck of an aircraft carrier.

According to Warfield, the MSFS developers went looking for 'fun' approaches to build into the experiences.

One of these is the approach into Hong Kong Kai Tak Airport (VHHX), known as the Checkerboard Approach or Hong Kong Turn, created by a retired Northwest Airlines captain turned programmer who had flown the approach in real life. The approach put aircraft very close to high-rise buildings.

"He knew the [Boeing] 747, and he knew that approach, and he knew it in enough detail that he would take off and fly the Checkerboard Approach inverted," says Warfield. "I've heard the airport is closed now, but from people who have been in there, I asked, 'How close did they get to the buildings?' And I was told, 'You could see people cooking in their kitchens.'"

Go Anywhere

With aviation simulation, you can virtually fly an aircraft any place in the world—feeling homesick for New York? You can take off from LaGuardia. Have a hankering to fly up the Vegas strip at night? Or around the pyramids of Egypt? That can be done.

There are some areas where game designers won't cross the line into absolute fantasy, says Warfield, "You'll never be able to take your general aviation aircraft into space." Also, there will be no dramatic and frighteningly realistic crashes in MSFS because, for all the attention paid to making sure the virtual aircraft fly as close to the real thing as possible, the developers have agreements with aircraft manufacturers if the virtual aircraft crashes, the simulation simply ends or the aircraft bounces back into the air.

Getting Started

There doesn't have to be a steep learning curve with the games, says Michael E. Puochi, a game developer who has been tinkering in virtual aviation since 1987 when he played Maverick in Nintendo's Entertainment Systems *Top Gun.* He's also a student pilot IRL.

"Most modern sims will let you fly in a few different modes from a 'simple' flight model that may have things

SIMS AS AN AVIATION GATEWAY

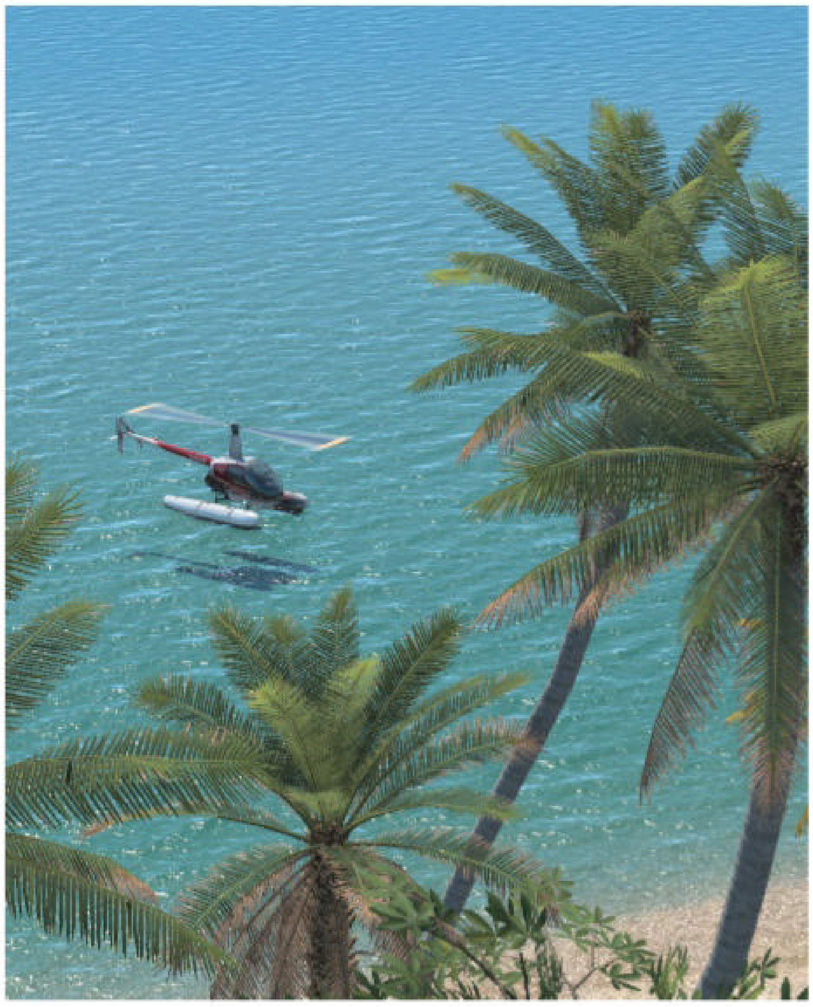
At CalPoly Humboldt in Arcata, California, a homebuilt simulator is a favorite of library patrons. Humboldt is the northernmost campus in the state university system, located on the rugged north coast.

In 2019 the PC gaming club built and installed the simulator, which consists of a non-moving platform, a gaming chair, and a console with toggle and rocker switches and appropriately colored knobs for throttle, propeller, and mixture. The aviation club took over operation of the simulator in 2022.

The simulator runs X-Plane. The sky and airplane are projected on a curved wall of video screens. The instrument panel is digital and correct. When the simulator was built, professor David Marshall, who holds both remote pilot (drone) and private pilot certificates, was the advisor to the club. Today, the aviation club, also advised by Marshall, takes care of and oversees the simulator, which is located on the second floor of the library in the area designated for collaboration. The space has whiteboards, desks, a VR setup, and a classroom-sized manual E6B.

Because the simulator is out in the open, posters are mounted over the screens providing instructions for its use.

At this time, the university doesn't have an aviation program per se, but the simulator is proving to be popular with students looking for a way to have some fun and explore aviation without making a big investment of time or money. They are learning that flight sims can be just as enjoyable as flying IRL, and as it is much less expensive, is an activity in reach of many.



like auto trim, auto rudder, self-righting, unlimited fuel, so the non-pilot can just experience flight with very little instruction or understanding of flight dynamics and basic pilot instruction. You can also go full realistic or 'advanced' where the aircraft will not fly itself and requires full input from the virtual pilot. The games are made to be accommodating to all skill levels."

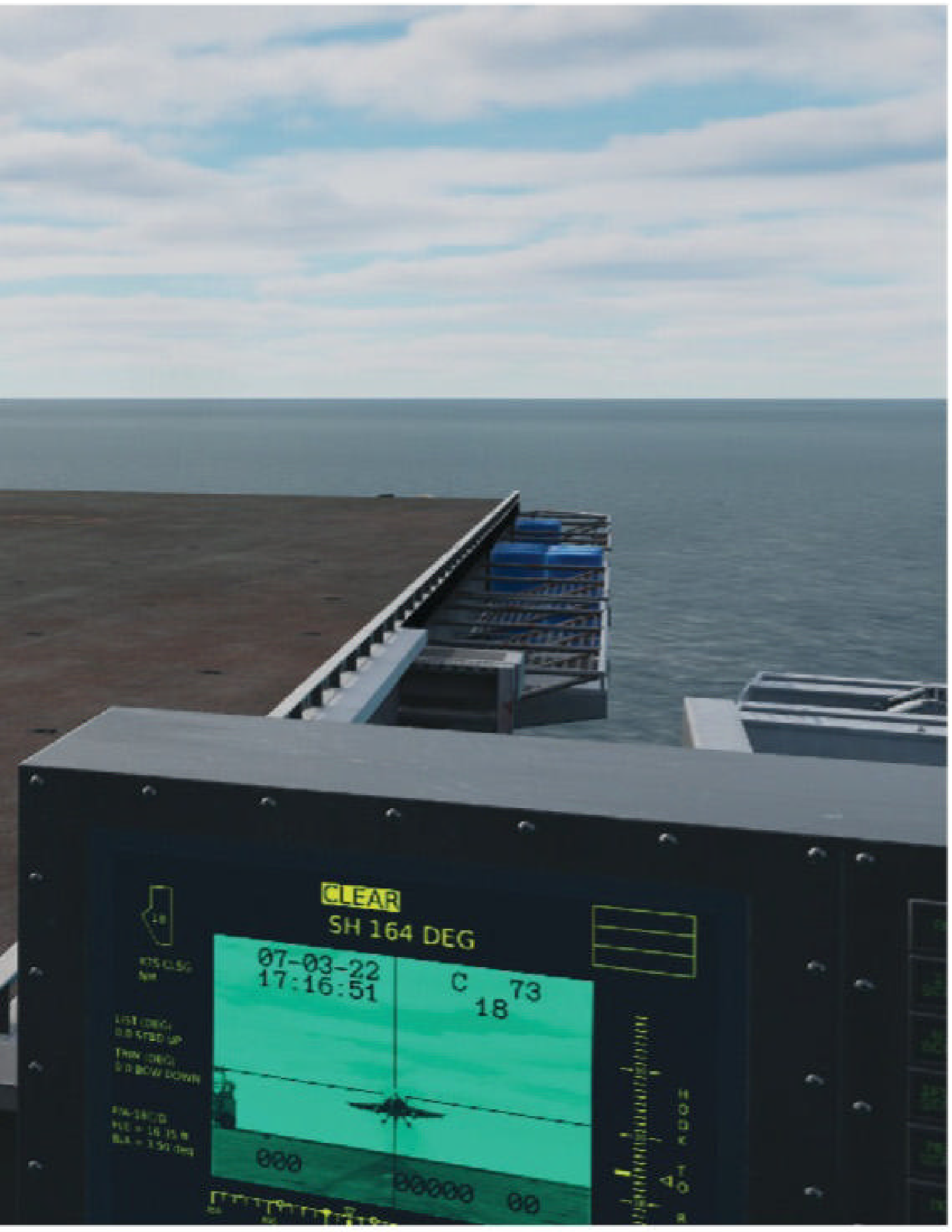
Puochi notes the sim creators use the pilot's operating handbook for the aircraft and rely on the guidance of subject matter experts (SMEs) such as pilots, aircraft designers, and mechanics to get the most accurate information for the aircraft's performance. They use laser scans of the cockpit and thousands of photos, videos, and recordings of various operating envelopes to get the virtual aircraft as close as they can to the real thing.

The Cost of the (Virtual) Cockpit

The price of virtual flight depends on how elaborate a setup the pilot wants. There are some who are content with a small control device and a laptop screen, while others will spend thousands of dollars on building a cockpit with rudder pedals, a yoke or stick, and even a VR panel.

"The more modern sims on the market you can spend upwards of thousands to tens of thousands of dollars. Some people have full motion flight platforms, scale pits

VNAO, X-Plane



that are fairly accurate to the actual aircraft in real life," says Puochi.

The interest can start young.

"About one-third of my students have a flight simulation set-up at home," says Robert Prosch, aeronautical lead instructor at the Museum of Flight in Seattle. The museum offers a Pathway Program for high school students, several who developed their interest in aviation through games. The Pathway program uses light simulation to reinforce classroom concepts, such as basic flight and aircraft handling and instrument interpretation, and helps students develop hand-eye coordination and aviation communication skills.

Prosch and his students assert that middle school is a good age for students to be exposed to flight sims, as this is the time in their life when they develop interests in things that often carry into adulthood.

"Start out with simple 'sandbox' type games, many of which are free or relatively inexpensive," suggests Prosch. ●

MEG GODLEWSKI has been an aviation journalist for over 20 years and a CFI for more than 18 years. She is a founding member of the Pilot Proficiency Center at EAA AirVenture.

TOP GUN FOR FUN

Would you like to be a Top Gun? There are virtual scenarios where each player is part of a squadron. Puochi, callsign 'Puffin,' is a regular participant in Virtual Naval Air Operations (VNAO), which celebrates its 15th anniversary this year.

According to Puochi, the premise of the group is emulating procedures used by the U.S. Navy, which means using the same methods as Naval Air Training and Operating Procedures Standardization. Participants become members of a squadron.

The group includes formally-trained military and civilian pilots who impart their extensive training and wealth of knowledge to the participants who are looking to learn as much as they can from the mentorships. The virtual pilots learn how to fly in formation, do inflight refueling, navigate, and practice launch and recovery off a virtual aircraft carrier.

"Taxi instructions, launch orders, and handoffs are done to the best of the ability of those involved in as realistic fashion as possible," says Puochi, who also has logged several hours as a private pilot candidate. "The mission commences, and then the recovery phase proceeds, probably one of the most fun parts because we have trained live LSOs (landing signal officers) in the sim on the LSO platform waving in recovering aircraft. It's really stressful and very fun at the same time, especially when you snag that third wire."

It can get complicated quickly, says Puochi, as the mission requirements of a multiplayer game often do. The virtual pilots need to understand procedures and their role in the mission. The pilots choose their own level of training and involvement, says Puochi, "from the casual pilot that just wants to know what it is like to do recovery and launch operations aboard the U.S. Navy's aircraft carriers, to the extreme enthusiast that wants to learn everything about how to fly and strategically use these study-level aircraft."

A BETTER VIRTUAL FLIGHT DECK

The mind behind X-Plane shares its origin story.

BY MEG GODLEWSKI

L**EARNING TO FLY** is not like learning to play a musical instrument, in that for most of us, it is impossible to practice at home—but wouldn't it be great if we could? Austin Meyer, the inventor of X-Plane, had this idea in the 1990s after a particularly frustrating experience involving an instrument proficiency check. Today, X-Plane is one of the top aviation simulation games in the world. You can put yourself at virtually any airport in just about any airplane. The game continues to evolve—*X-Plane 12* was released just before the 2022 holiday season. *FLYING* caught up with Meyer to get the skinny on the development of the popular pastime that has evolved from game to simulation experience.

Jeff Blake

X-Plane quickly gained its reputation for superior visuals and precise aircraft modeling soon after its release.

FLYING Magazine (FM): *As the inventor of X-Plane, you hold a remarkable position in the industry. How long have you been in game design?*

Austin Meyer (AM): Since 1993. [The first] *X-Plane* was the first computer program I ever wrote.

FM: *What inspired you to create X-Plane?*

AM: I was taking an instrument proficiency check. You can't actually fail those—you have to keep going until you get the signoff. I had to go up on like four flights to get the signoff, and I found that very frustrating. I decided to never put myself in that situation again. I needed to practice at home, but I flew a Piper Archer II—and Microsoft Flight Sim didn't have a Piper Archer II at the time—and I knew they wouldn't put one in for me, so I wrote my own simulator. It was called *Archer II IFR*. I didn't have all the performance data for the Piper Archer II, so I said, 'let's look at the geometry of this airplane and see how it must perform according to the laws of physics,' and when I did that, I had an airplane that flew just like a Piper Archer II. Then I realized that if I had that math and looked at the geometry of airplane and then [flew] it…I could apply it to any airplane you can imagine—so I renamed it to *X-Plane*. This was in 1995.

FM: *I've heard that X-Plane allows users to add their own scenery to the program. Is that true?*

AM: Yes. [For example,] there are about 30,000 hangars in the [current] X-Plane right now. A person can build it virtually, then load it onto the server.

FM: *You mentioned one of the triumphs of* X-Plane 12—*which was released in December 2022—was getting the clouds to change during the duration of the virtual flight. How was that accomplished?*

AM: We finally got the clouds to be honest-to-goodness volumetric. They are three-dimensional, and we had that volumetric matrix to get the elevation, then all you need to do is manipulate it over time—and there is your fourth dimension, time.

FM: *Is the X-Plane software designed for a particular brand of simulator?*

AM: Our customers buy X-Plane, and once they have their copy…can build a simulator out of it. Precision Flight Controls in particular has [become] very, very good at this. Many companies buy X-Plane and then present it to the FAA for certification, but I would say the percentage of the sims that are certified by the FAA are minute. The vast majority use X-Plane because they love using [it].

FM: *You mentioned that users of the software can 'build' airports to add to the airport library in X-Plane. How is that done? Does it take a certain level of skill or sophistication to do this?*

AM: [You can use] Google World Editor, for X-Plane… sometimes called WED [an animation tool for Google 3D imagery].

FM: *For the person who is just beginning their experience with X-Plane, are there any tips for getting maximum enjoyment? Is there a scenario you recommend?*

AM: For newcomers, my primary recommendation is that they purchase an inexpensive joystick from Amazon

X-Plane (2)

(one that costs $30 or so). That $30 really goes a long way to making the experience with X-Plane more authentic.

FM: *If you could go back to 1995 and give the younger you advice about the development of X-Plane, what would you say?*

AM: Really I would not need any big-picture advice...I don't think I've ever made a major big-picture mistake with this simulator. If I could go back in time, I would just want to bring my computer back with me with all of the source code on it just to save myself time, that's all.

FM: *Are there any aircraft on your bucket list in X-Plane? If so, what are they?*

AM: My bucket list airplane is the T-38. I have not released that in X-Plane yet for contractual reasons, but I [have] flown it in [the software] for many hours, and it is a great airplane in the simulator as well.

FM: *You mentioned that sometimes people get a copy of X-Plane and build a physical simulator around it. Are we talking individuals looking for fun or professional pilots?*

AM: Both. In 2023 we will be focusing on the professional use application of X-Plane. There are already simulator manufacturers that use X-Plane in their products, such as Precision Flight Controls.

FM: *You describe the scenery of* X-Plane 12 *as 'pretty basic.' Any plans to change that?*

AM: Many pilots are clamoring for more of a Google Earth experience—you know, they want to fly over their house—but that's not what X-Plane was made for. When I write a simulator I am looking at the airport environment. When the nose is down, I want to see the airport. I want to see the avionics, I want an accurate flight model, I want to see the weather, I want the engines and systems and air traffic control to be changing just like they do during a flight. I want all those things you do to manage a flight from startup to shutdown. That is the type of aviation I am experiencing all the time, and that is the simulation I want to bring to people.

FM: *What's the most important thing for our readers to know about X-Plane?*

AM: X-Plane lets you enter the design of any airplane and then see how that airplane would fly if you were to build it in reality. With that mathematical foundation, X-Plane accurately simulates how existing airplanes fly as well. This gives the most accurate flight simulation you are going to find in a flight simulation system with three-dimensional, ever-changing real-weather, air traffic control, and other aircraft in the sky with you. It's not a glorified scenery-viewer. ●

QUICK 6

Who's the one person living or dead you would most like to fly with?

Orville or Wilbur Wright...in my Lancair!

If you could fly any aircraft you have not yet flown, what would that be?

The T-38...with Orville or Wilbur Wright!

What is one airport you've always wanted to fly into?

The airport is just the "door"...I get excited about the airplane and the destination.

What do you believe has been aviation's biggest breakthrough event or innovation?

The modern, reliable, high-bypass turbofans that make modern jet travel possible.

What has been your favorite airplane to fly?

My Lancair Evolution...so far...

When I'm not flying, I'd rather be...

Coding

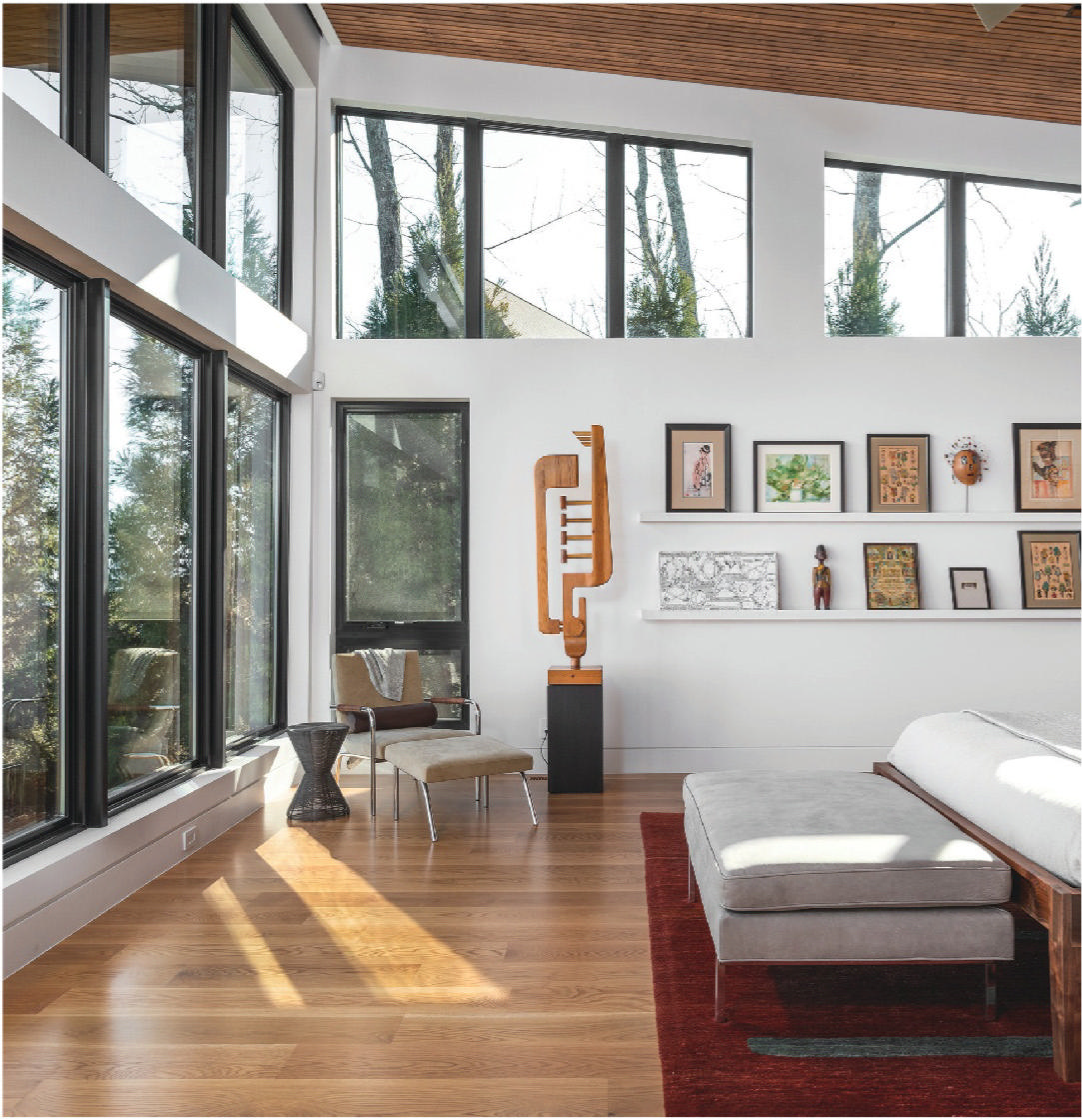
Users can build their own airports in X-Plane.

Concept Designs
H.K. ARCHITECHTS | Chattanooga, TN

THE FIELDS

From a design standpoint, Cumberland Contemporary has emerged as the architectural style of The Fields. Cumberland Contemporary is defined as a mountain-modern approach that is uniquely inspired by the Cumberland region of Tennessee, which includes the Sequatchie Valley where The Fields is located. Materials used to achieve the style are natural and sustainable, including regionally sourced timber and stone that apply a luxury rustic aesthetic with hints of modern design elements.

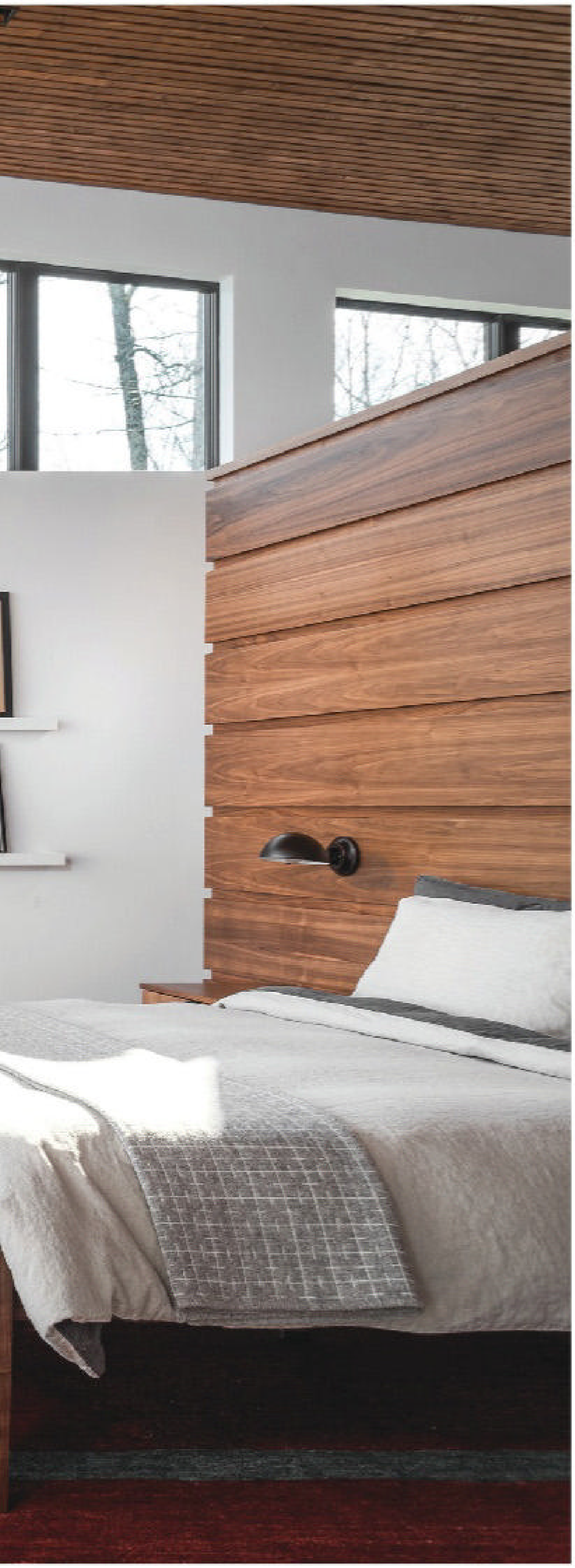
FLYTHEFIELDS.COM



INTERIOR INSPIRATION

Concept Designs
H.K. ARCHITECHTS | Chattanooga, TN

THE FIELDS



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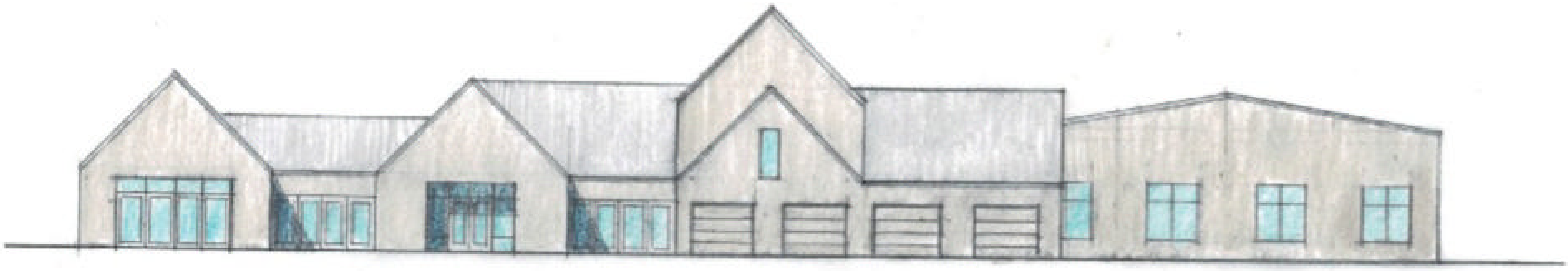
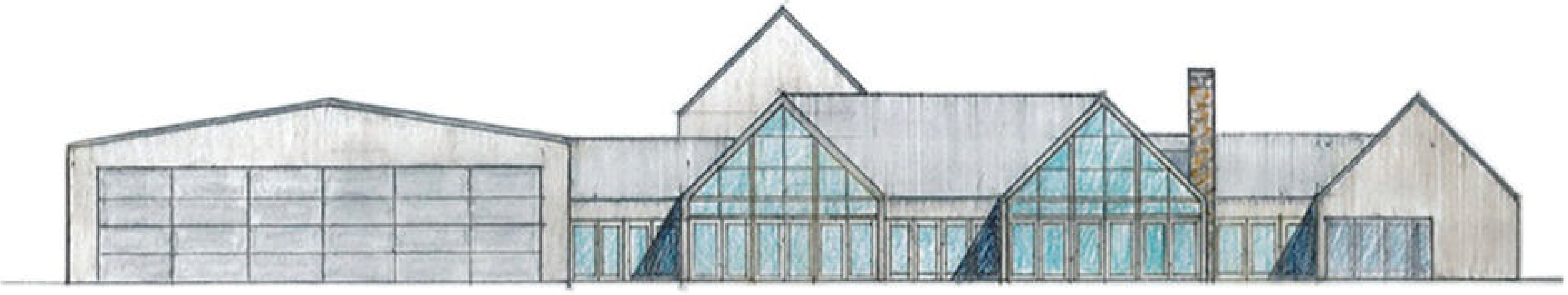
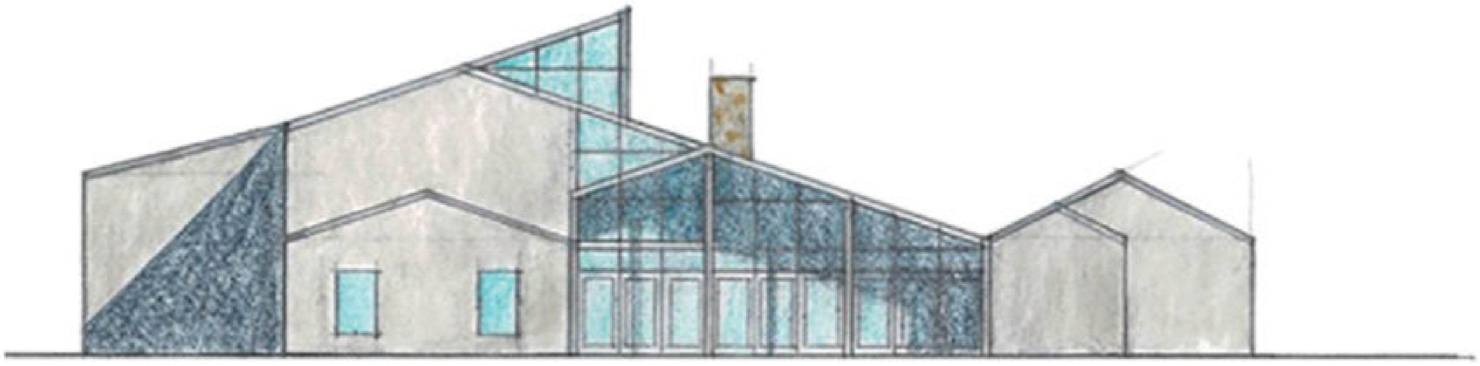
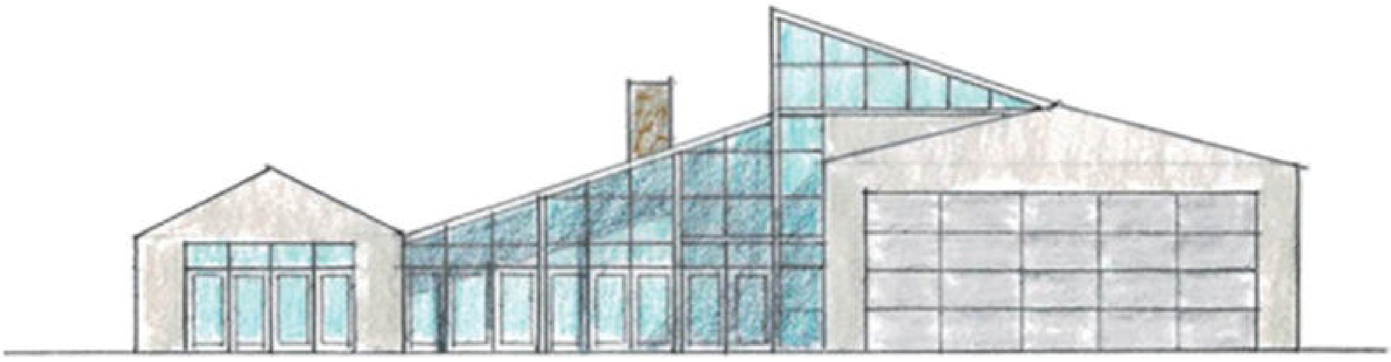


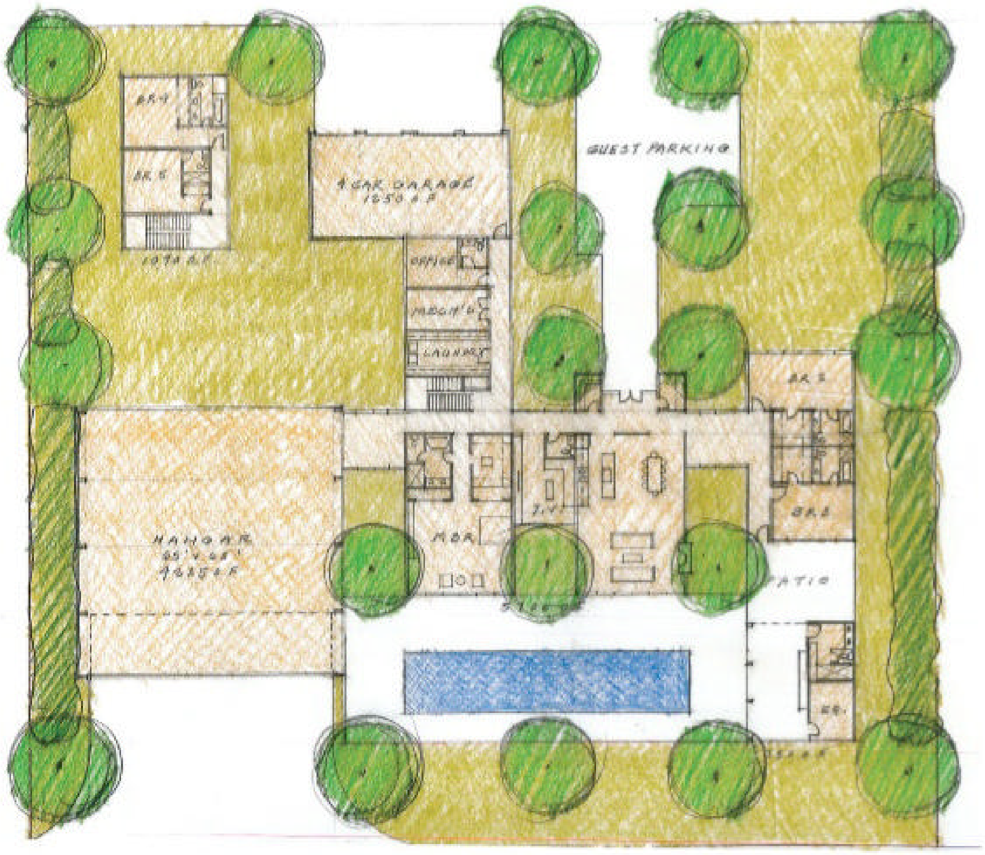


1 ACRE LOT | 5 BR, 6.5 BATH. | 5700 S.F. | 65’ X 65’ HANGAR





1 ACRE LOT | 3 BR, 3.5 BATH. | 4000 S.F. | 45’ X 45’ HANGAR


BR 4
BR 5
1070 S.F.
4 CAR GARAGE
1050 S.F.
GUEST PARKING
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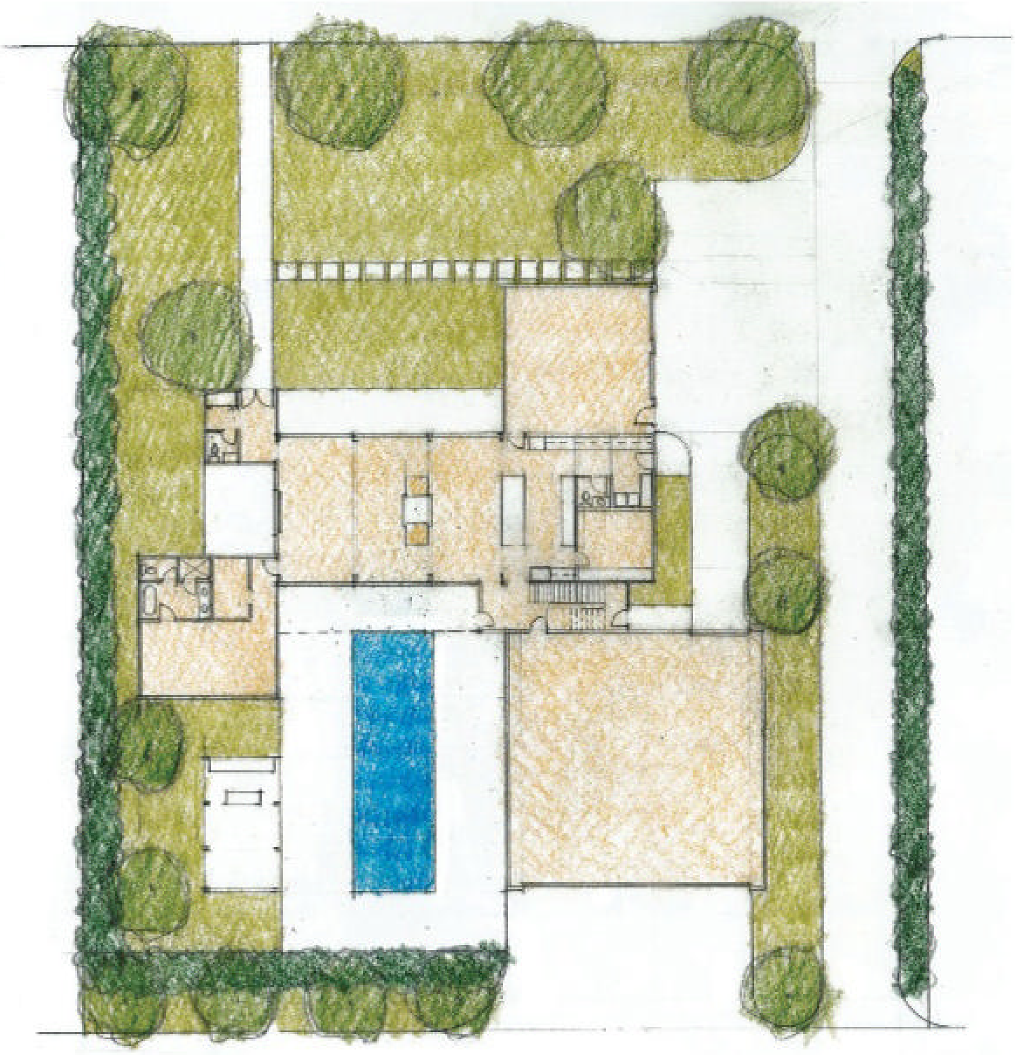
BR 2
HANGAR
65'x65'
4225 S.F.
MBR
PATIO
BR



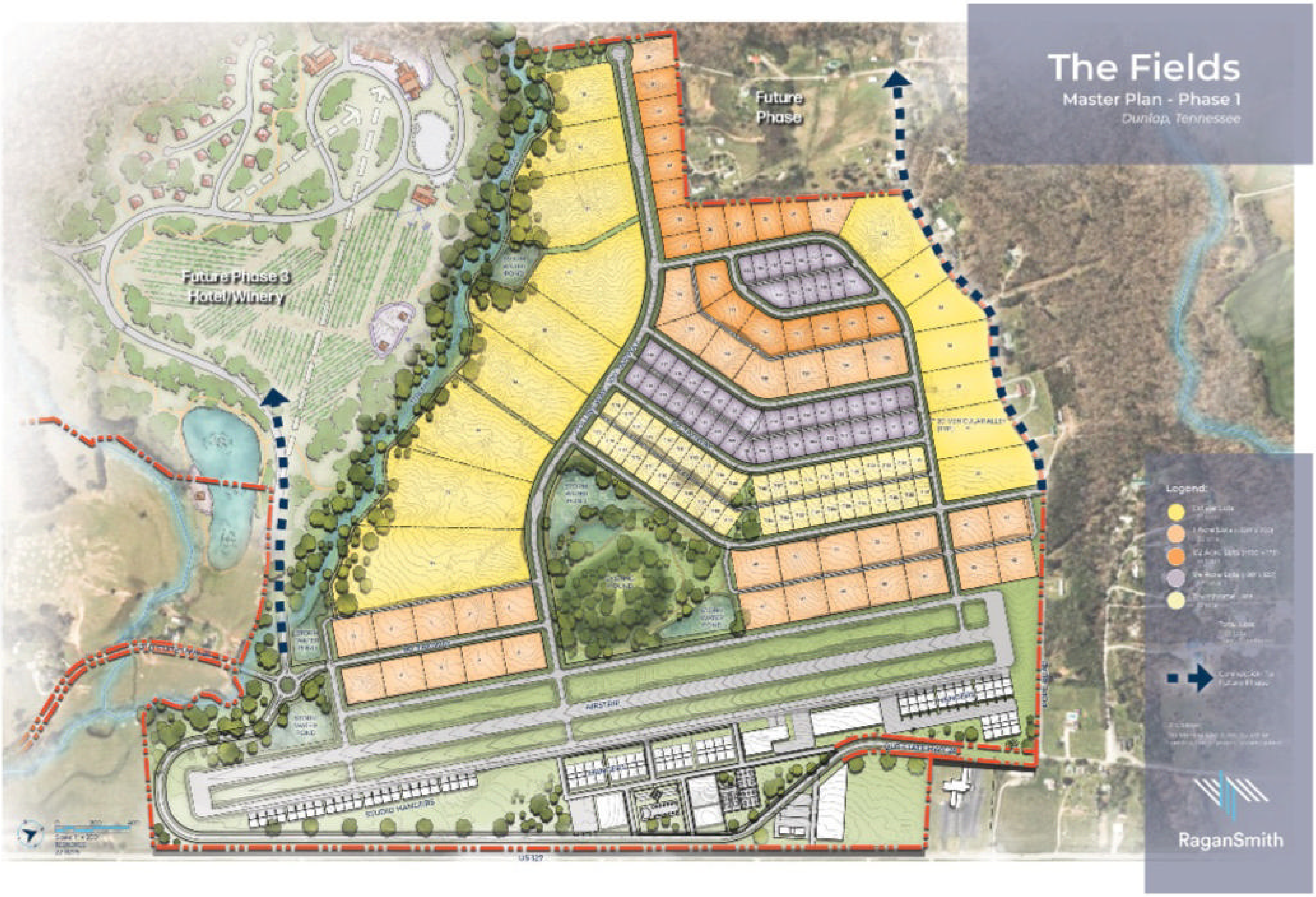
Concept Designs
H.K. ARCHITECHTS | Chattanooga, TN

THE FIELDS

The Fields is a luxury fly-in resort and community that features an airpark with hangar homes and outdoor adventure activities.

- Tennessee is one of the lowest-cost states in the U.S. to live (No state income or capital gain taxes)
- Located in the Sequatchie Valley, Tennessee (30 miles from Chattanooga and 90 miles from Nashville)
- Lots with runway access
- Valley and mountain properties available, suitable for smaller homes or large estates
- Community to include farm-to-table restaurants, retail, spa and resort
- Outdoor activities to include rock climbing, equestrian activities, vineyard/winery, 4x4, hang gliding, kayaking, plus boating and water sports on nearby lakes

FLYTHEFIELDS.COM


The Fields
Master Plan - Phase 1
Dunlap, Tennessee
Future Phase
Future Phase 3
Hotel/Winery
AIRSTRIP
STUDIO HANGARS
US 127
Legend:
Total Lots
RaganSmith

EXPERIENCE THE FIELDS

To learn more about lot reservations and to stay up-to-date on the latest, visit **flythefields.com**

THE FIELDS

For those aircraft owners who live the aviation lifestyle, many find themselves dreaming of living with their aircraft and being able to preflight, taxi, and take off to a destination within minutes of leaving the house. Whether it's a single-day business trip allowing for dinner plans at home to stay intact, or the entire family loading up to visit friends in a neighboring state—living with your airplane unlocks opportunities. For most, living in a fly-in community requires a trade-off between the amenities expected from a master-planned development and those required by an operating airport—to satisfy everyone's needs in the household—and thus it remains a dream.

At its core, The Fields has been developed to solve this dilemma. Designed by pilots and keeping family, friends, and non-aviation residents in mind as a priority, The Fields marries the best of fly-in community living with world-class amenities everyone can enjoy. "We wanted to design a development that has community at its core, allowing for pilots to enjoy the advantages aviation unlocks while focusing on the key aspects that make a new urbanist community attractive," says Jon Ricketts, partner in The Fields. "This concept is unique to aviation, as other developments don't cater to the non-aviation spouse or family. We wanted a community that our spouses would be proud to call home and invite their friends to visit."

In addition to the onsite amenities surrounding a 4,300-foot runway, The Fields is strategically located in southeastern Tennessee. The area features a long list of beautiful flying adventures nearby, close proximity to major metropolitan areas, and a tax-friendly state for residents. By pilots, for pilots—The Fields is the new standard for fly-in communities.

FLYTHEFIELDS.COM

PART ONE

WE FLY

BRM AERO BRISTELL SLSA

The two-seat runabout might be heavy, fast, and priced at a premium—but that's okay.

BY JULIE BOATMAN

IMAGES BY LEONARDO CORREA LUNA

Sitting next to a posse of Cirrus SRs on the ramp at the Naples Airport (KAPF), the Bristell SLSA looked right at home—like a speedy little brother ready to run around and make trouble. But that's not the airplane's DNA at all. Instead, the combination of responsive yet solid flight controls, respectable climb performance, and advanced avionics on the flight deck mean it serves as a great two-person cross-country flying machine—or a fine way to build skill towards an instrument rating and competence to fly heavier, faster aircraft.

A CROSS-COUNTRY MACHINE

That's exactly the market space Bristell's U.S. importers and sales representatives seek to serve. BRM Aero—which builds the Classic and its special light sport aircraft (SLSA) version—is based in the Czech Republic (see "The Family Behind the Bristell"). Roughly 800 models have been delivered globally, with 100 in the U.S. flown by private owners and flying clubs.

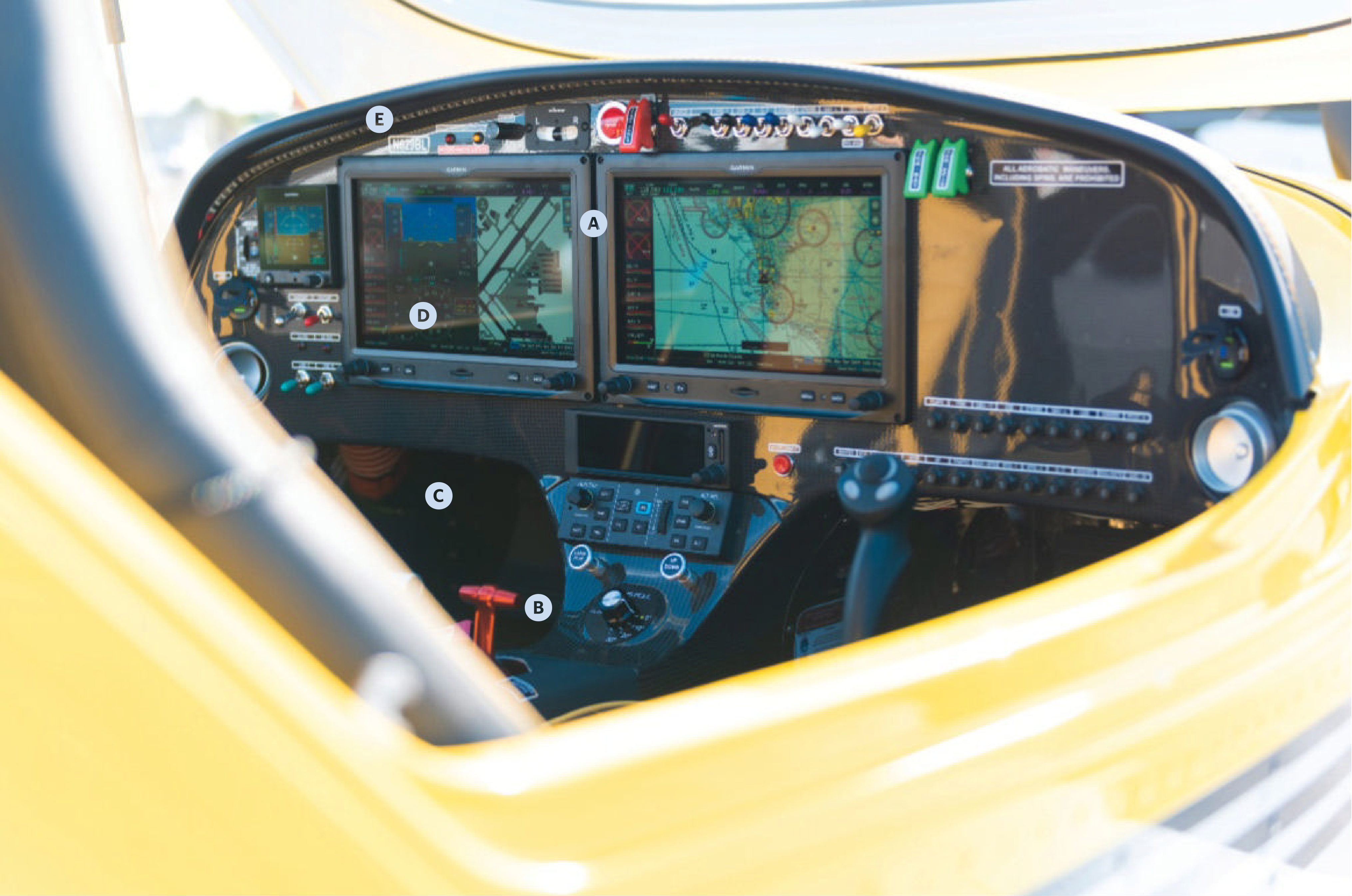
Bristell national sales manager John Rathmell thinks the model has found an excellent niche. Rathmell explained the SLSA: "It just fits in as an excellent all-around airplane for multiple reasons. Quality, performance, comfort, and cost efficiency—without the need for a medical."

BRM Aero launched the SLSA 10 years ago in a customizable way, with a series of engine and avionics choices to select depending on where the airplane is based and the specifics of the mission. We flew two of the SLSA versions, both IFR-ready, with the higher-powered, turbocharged Rotax 915iS option.

With the wide cockpit—130 cm or 51.2 inches—and clear expanse of canopy, the SLSA feels from the outset more like a cross-country machine that has been designed with comfort in mind. For example, the thoughtfully placed vents (an option) and the ability to taxi with the canopy open give relief on hot days. Rathmell cautions, "If you want to load the plane up with a ballistic recovery system, long-range tanks, and IFR avionics, you must keep in mind the 1,320-pound LSA weight limit has not yet changed, so you can find yourself bumping up against the max weight during the build spec phase."

On the Bristell website, design options just scratch the surface of what is possible. It also lends itself to browsing through the company's other models, the B23 and B23 Turbo, and the upcoming high-wing B8. When MOSAIC passes, BRM is positioned to serve U.S. customers with faster, heavier aircraft that suit the cross-country market with even greater flexibility.

The Bristell SLSA resembles the Sport Cruiser/Piper Sport, an early design from company founder Milan Bristela.



Ⓐ The Garmin G3X Touch provides the interface for most functions of the aircraft's brainpower.

Ⓑ The throttle control sits next to the hand-actuated braking system.

Ⓒ The rudder pedals are adjustable while the seats are fixed in place, giving a comfortable yet sporty ride in the airplane.

Ⓓ The SLSA models flown for this report come with a Garmin autopilot and enhanced stability protection (ESP) to help keep the pilot upright in the event of an upset.

Ⓔ The angle of attack presentation is customizable by the pilot, and the entire glareshield's red LED lighting flashes on brightly when an exceedance is imminent. You cannot miss it.

POWER UP FRONT

The SLSA series comes from the factory with a choice of Rotax engines. The baseline 912 ULS delivers 100 hp on a normally aspirated powerplant with a reduction gearbox, and it creates a standard LSA that most folks understand and complies with ASTM standards as well as the FAA's light sport guidelines in the U.S.

The basic empty weight of the SLSA model is 725 pounds, and is designed for a maximum takeoff weight of 1,320 pounds (roughly 600 kg), allowing for operations in the EU in the UL category as well.

However, the enticing 915iS in the SLSA promises more power, speed (at altitude), and operational flexibility. The turbocharged engine offers up to 141 hp (135 hp at max continuous power and 5,500 rpm), allowing the LSA to slide into the outside lane. That extra capability up front translates into a wider performance margin—also benefiting from the SLSA's 100-pound lighter empty weight than its competitors. The four-cylinder 915iS integrates a beefier reduction gearbox and supports the more advanced electrical system needed to power the SLSA's avionics. The engine also prefers an MTV-34-1-A hydraulically adjustable three-blade constant-speed propeller. However, the regs require a ground-adjustable prop. We flew with both the DUC 4-blade and Sensenich 3-blade options, with the DUC giving a bit more speed in cruise.

BRAINS—AND SAFETY MODES

On the flight deck, the Bristell LSA features a standard package tailored to suit customer needs within the personal transportation realm. The panel is designed around dual Garmin G3X Touch integrated flight displays. Options include the Garmin 750, dual remote radios, audio panel and intercom, and a G5 electronic flight instrument to provide additional backup. A GMC 507 autopilot panel provides 3-axis functionality. With the magic boxes up front, the full enhanced stability protection (ESP), Safe Glide, XM weather and music, and angle of attack (AOA) info comes along, enabled by the Garmin avionics suite and a heated AOA probe.

The safety modes can be configured to present data on the display(s) in various ways, and ESP may be turned off to facilitate the advanced maneuvering required for flight training—or, as in our case, a thorough demo flight profile to fully explore the performance envelope.

Taxiing involves deft manipulation of the throttle and the red lever, which actuates the braking system.

FIRST TAKE

Rathmell wanted to introduce me to the model prior to our date down south for the photo mission, so he flew a customer airplane over from the company's U.S. headquarters in Lancaster, Pennsylvania. N247BW came dressed a bit differently in a red, white, and blue American flag-inspired color scheme.

With the steerable nose wheel and a hand-actuated braking system, it didn't take long for me to get the hang of taxiing and ground maneuvering. We also briefed the emergency use of the BRS ballistic recovery system, with its bright red aluminum handle located at my right knee.

It was a bumpy day in the traffic pattern, with winds gusting in the high 20s, generating rough air down low. We took three trips around—one demo landing, one with me on the controls and Rathmell coaching, and one on the long runway to demonstrate the 90-degree-crosswind prowess of the airplane, which is significant.

It was a great way to judge how the model handles moderate chop, like a much heavier airplane. With the tightly-coupled, center-mounted control stick low-slung in my lap, it was natural to brace against my inner legs to dampen erratic movement caused by the chop. And we vowed to fly more in better conditions.

MIN. 91 OCT AKI / 100LL
21.6 U.S. GAL
915iS
BRISTELL

The sporty interior can feature high-voltage styling, while the Rotax 915iS up front delivers the goods.

The coastline south of Marco Island, Florida, shows few signs of the devastating Hurricane Ian that pummeled its way through the Fort Myers area to the north. A few mangroves reveal tumbled-over trunks and branches in bunches teetering right above the level of the gulf waters that inundate southwestern Florida.

We can see this clearly as we circle lower and lower—1,000 feet, then 800 feet above the water—to capture the backgrounds against which the highway-stripe-yellow and silver-gray mantle of the Bristell we're flying will surely pop, accentuating its sleek and speed-parlaying lines.

During the aerial photo mission, Rathmell flies off the AirCam, then hands the controls over to me so that I can see how the Bristell SLSA handles in close formation flight. This is where you find out how deftly you can manage the throttle in fine increments and how balanced the controls feel in slow flight—because we ask strange things of the ailerons, rudder, and elevator to stay on station and make the airplane do what the photographer asks.

The throttle is not big even in my relatively small hands, and fine movements are possible but perhaps not as easy as when using a throttle lever with a longer throw. Still, the solidness of the stick means it takes intention to induce roll and pitch—and that's a good thing. After the sun hits the horizon, sinking into the west, we're done taking photos—but we still have at

BRM AERO BRISTELL SLSA

Price (fully equipped, as tested): $366,000
Engine: Rotax 915iS, turbocharged
TBO (or equivalent): 1,200 hours
Horsepower: 141 hp, maximum continuous
Propeller: Sensenich 3-blade composite
Seats: 2
Wingspan: 9.13 m, 29.53 ft.
Length: 6.45 m, 19.68 ft.
Height: 2.28 m, 6.56 ft.
Cabin width: 130 cm, 51.2 in.
Baggage Weight: 55 kg, 121.25 lbs.
Basic Empty Weight (U.S. SLSA): 725 lb.
Max Takeoff Weight (U.S. SLSA): 1,320 lb.
Basic Useful Load: 595 lb.
Fuel: 120 liters/ 32 gal., 28.5 gal. usable (standard tanks); 43.2 gal. total (extended range tanks)
Max Rate of Climb: 1,500 fpm
Max Operating Altitude: 23,000 ft.
Stall Speed (flaps extended): 43 kias
Max Cruise Speed: 120 ktas, at sea level, max continuous power
Max Endurance: 6.5 hours plus VFR reserves at best economy power
Takeoff Distance, Sea Level (over a 50 ft. obs.): 331 m, 1,086 ft.
Landing Distance, Sea Level (over a 50 ft. obs.): 391 m, 1,283 ft.

least 45 minutes before full-on darkness arrives. So Rathmell and I break off and climb so that I can taste the "high work": the maneuvers that form the baseline of my process in sampling an airplane.

First off, our climb starts with setting the power back up from station-keeping to max continuous (5,500 rpm) so that I can see a climb at best rate (84 kias)—we get an average of about 1,400 to 1,600 fpm from 1,500 feet to 3,500 feet msl. Once at altitude, I set airspeed below V_A (97 kcas) to get my groove together for a couple of steep turns to the left and right.

Then it's on to slow flight, and I relax the throttle back to bleed off airspeed while I hold a level attitude. We're aiming first for 75 kias, the top of the white arc, so we can deploy flaps, incrementally to full. Doing so induces almost no pitching moment—a point Rathmell had demonstrated on one of our takeoffs on the earlier flight by showing what a non-event it was if you forget to bring the flaps up before you start a takeoff roll and dump them all at once right after takeoff. Those flaps—along with the stabilizer—are large and efficient. The airplane wallows around a bit at low speed—the AOA gets cross with us, and the glareshield's red LED under-panel lighting flashes on. You can't miss the fact you are deep into the low end of the scale. It takes a sharp pull back to get the airplane to break in the power-off stall, and it's more of a mush at roughly 43 knots on the tape. With power on, there's a wing drop to the left for us, at about 47 knots indicated.

I also put the sporty airplane through a few back and forths in lazy 8s to feel the Bristell's control coupling and arc through low speed to high as we slice an 8 on its side through the horizon. The view from the left seat allows for a broad look around, with no struts.

We level at 3,000 feet and set power at 4,400 rpm and 23.3 inches for the cruise back to KAPF, giving us 36 percent power. We're loafing along at 103 knots indicated (109 ktas) as a result. We have been sipping fuel all along, but this shows us at 4.5 gph in eco mode—full power translates to 10.5 gph. The wing tanks hold a total of 16 gallons (21.6 gallons with extended-range tanks) per side for an endurance of 6.5 hours plus VFR reserves at best economy power. All of my initial landings came together easily within 900 feet of ground roll on the runway—and the nearly-night landing back at Naples was even shorter.

INTERIOR DETAILS

The two-seat airplane has low-slung seats, placing you in drive mode, with adjustable rudder pedals. The comfort factor is real, not just reported, with a cockpit layout that puts everything in reach. The baggage compartment is accessible in its entirety from the seats, with a 15 kg (about 33 pounds) capacity. Two wing lockers hold an additional 20 kg (about 44 pounds) apiece but cannot be reached in flight unless you pull a wing-walking move (not recommended).

The interior selections run from utility to luxury leather options, with a sporty theme informing the ones in those models we tested for this report. Details include map pockets and a stash box in the central armrest.

Every Bristell comes with a custom tool kit that Rathmell says is designed to facilitate happy cross-country flying, from minor maintenance adjustments to being able to tie down on unfamiliar ramps.

PART TWO

THE FAMILY BEHIND THE BRISTELL

A custom shop producing bespoke airplanes

BY JULIE BOATMAN
IMAGES BY LEONARDO CORREA LUNA

JOHN RATHMELL *figures he now has as many hours in Bristell aircraft as anyone in the U.S. With more than 800 aircraft delivered worldwide, that distinction is sure to change in the coming years.*

The Czech company runs a boutique-style shop, crafting about 120 custom aircraft in total each year, with a couple dozen of those headed for the U.S. from its headquarters in Kuňovice. It's a solid production run that ensures a personal touch on each airplane that's built.

FAMILY FOUNDERS

The name "Bristell" derives from Bristela, the surname shared by the father and son who established and run the company. Father Milan Bristela, founder and CEO, earned his degree in aircraft certification and production from the Antonín Zápotocký Military Academy in Brno, Czech Republic. He's been in aviation since 1983.

The BRM models resemble another light sport airplane—the Sport Cruiser/PiperSport. Milan worked on that design with Czech Sport Air Works prior to its U.S. introduction. However, Piper's LSA partnership never gained traction, and Milan knew he could improve on that design with his own evolution. Therefore, with son Martin, he founded BRM Aero S.R.O. in 2009 with the intention of creating LSA and ultralight category-leading aircraft for personal use and pleasure. Martin is a full partner and also the COO, with a background in racing automotive maintenance and the instrument/commercial pilot license he 's secured —and we expect he'll take the reins as his dad spends more time in the design department.

BRM Aero has produced a retract model, not available in the U.S., the Bristell RG, and a "spur gear" airplane, the Bristell TDO. The OEM built its own state-of-the-art facility at the Letiště Kunovice airport (LKKU). Today, it employs more than 130 people, and it plans to increase production by 50 in the next two years.

INTERNATIONAL GROWTH

The Bristelas had long set their sights on reaching farther than the EU's borders with their designs, so in 2012, they connected with their first U.S. importers and continued that with the establishment of the relationship with Lou Mancuso, of Sport Flying USA, with whom Rathmell has partnered, along with Rich Maisano and others. They represent a steady support structure for the U.S. market, stocking new engines and significant parts inventory. Each aircraft comes with an 18-month, 200-hour factory warranty and post-warranty service plan, which includes mods as well as required maintenance and repair work.

The fit and finish of the models we tested speaks to why pilots have raved about the Bristell SLSA ever since.

BETTER TRAINING

One key area in ensuring both the customer's satisfaction and their safety lies in good training. After we flew, Rathmell handed me a challenge coin marking my induction into the ranks of Bristell pilots. On the reverse, it's stamped with the acronyms "DFGAP," "GPA," and "PLC." These mnemonics stem from Mancuso's "Landing Doctor" training program developed for light sport aircraft and refined for the Bristells. They stand for "defined go-around point," ground proximity awareness," and "personal limitations checklist."

Mancuso and Rathmell intend for pilots to carry this tangible reminder in their pocket—and take those safety points to heart. ●

AVIONICS FOR YOUR LSA

Things to consider when you upgrade your panel

BY MEG GODLEWSKI

THERE COMES A TIME in every aircraft owner's life when they decide it is time to upgrade the instrument panel. This process is neither quick nor inexpensive, and there are pitfalls along the way—especially if you own a light sport aircraft. Among the common traps are finding enough panel space to create your dream screen—and getting the required approvals for the changes.

Michael Schofield, director of marketing for Dynon Avionics, says that they often get telephone calls from owners of SLSAs (built to a conforming model by an OEM) who want to change the avionics and are surprised to learn that only the manufacturer of the LSA can approve the change, unlike the normal supplemental type certificate process.

"They can't just dive into it and make a change," says Schofield, because under the light sport category, the avionics are part of the approved equipment during LSA certification. "It's a pretty typical support call when someone will say 'I have an SLSA and I want to make a change.' They are surprised to learn that they have to go through the manufacturer to get permission for the change or else they have to take the aircraft out of SLSA and put it into the experimental or ELSA category."

The downside of this is that ELSAs—with E standing for 'experimental'—cannot be used for aircraft rental or flight instruction. If the aircraft is a revenue-generating device, changing into this category may not be in your best interest.

From Experimental to LSA

Dynon Avionics is based in Woodinville, Washington, north of Seattle, and it has a satellite operation in Portland, Oregon. The company, founded in 2000 by a pilot and semiconductor entrepreneur, makes avionics for light aircraft. According to Schofield, in the beginning, the company's largest audiences were the builders and owners of experimental aircraft looking for functional

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RPM
RPM 2070
MAIN
GAL/HR 6.3
LEFT GAL
RIGHT GAL
ROP 48%
994.0 HOBBS
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MENU
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STROBE
LAND LT
PITOT
DEFROST
FLAPS
NAV
PULSE
THROTTLE
MIXTURE
PUSH OPEN

displays that didn't swallow the whole panel.

"Back in 2004, we were already the experimental market share leader making avionics for [Van's Aircraft] RVs and Glasairs and whatnot, and when light sport came about, we realized it was an opportunity." Schofield notes that Dynon is the recognized first participant in the LSA avionics market, followed by Garmin and a few smaller avionics manufacturers. Dynon also works with OEMs as they design panels for new aircraft.

The product designs are pushed by the customer's desires, said Schofield, and they continue to evolve. "The original EFIS D-10 was released in 2003, and in 2020 we were incorporated [into instrument panels] pretty quickly. We had the whole first generation line of 4- and 7-inch EFISs [electronic flight information systems], and the SkyView—the current platform—came out in 2009. The SkyView HGX—[which came out in 2018] is the latest incarnation with the touch screen and a better interface."

The avionics need to be usable, but have a minimal footprint, says Schofield, who describes it as a balancing act. "One of the things that we focused on in the initial issue of SkyView was the minimal footprint, and it has carried through. So if we have a 10-inch screen, we don't want to have too much bezel around it, although you may want to grow that for the internal space because maybe you can make circuit boards fit better if you grow it a little. But for every quarter inch you grow in every direction, you lose the ability to fit [it into] some model of aircraft."

The Learning Curve

For the pilot transitioning from round dials—the so-called 'steam gauges'—there may be a bit of a learning curve, says Schofield, although it is nowhere near as challenging as it used to be, as most pilots are more accustomed to using panel-style technology. "We used to hear, when the EFIS was new: 'I don't know what I am looking at.' That has evolved over the last 5 to 10 years as everyone has iPads, iPhones, and super-light laptops. People are getting more familiar with the technology. We actually came out with a feature on the EFIS display where you have wall-to-wall synthetic vision that doesn't look like an attitude indicator—it is like looking out the window."

Schofield adds that the instruments shown on the display are created by the software, and with a few button taps, the screen will revert so that instead of tapes, the familiar round gauges appear.

Color coding is used for engine and system monitoring gauges. Red signals an emergency condition, yellow says caution, and green highlights normal operations. This can make it easier to determine if the aircraft engine is having a problem because the colors are easy to discern—as opposed to an analog read-out where the pilot must remember which values indicate trouble.

"You don't have to actively think about what is wrong—just scan quickly. If it is red, you know," says Schofield. "If it is red there is a voice alert [such as] 'oil temperature high' or whatnot. There is a lot lower workload—once you get over the 'ooh there is a lot there' aspect."

Programming the avionics is fairly intuitive, says Schofield. "I could teach you by taking you through two or three operational principles: This is how the touch screen works, etc. The programming is done by a combination of buttons and knobs. We did it that way because in light aircraft it can get pretty bumpy and an outstretched arm on a flight cannot be perfectly precise," he explains.

Picking Your Avionics

What avionics the owner selects for an LSA panel upgrade is driven by a combination of aircraft mission, budget, and panel space.

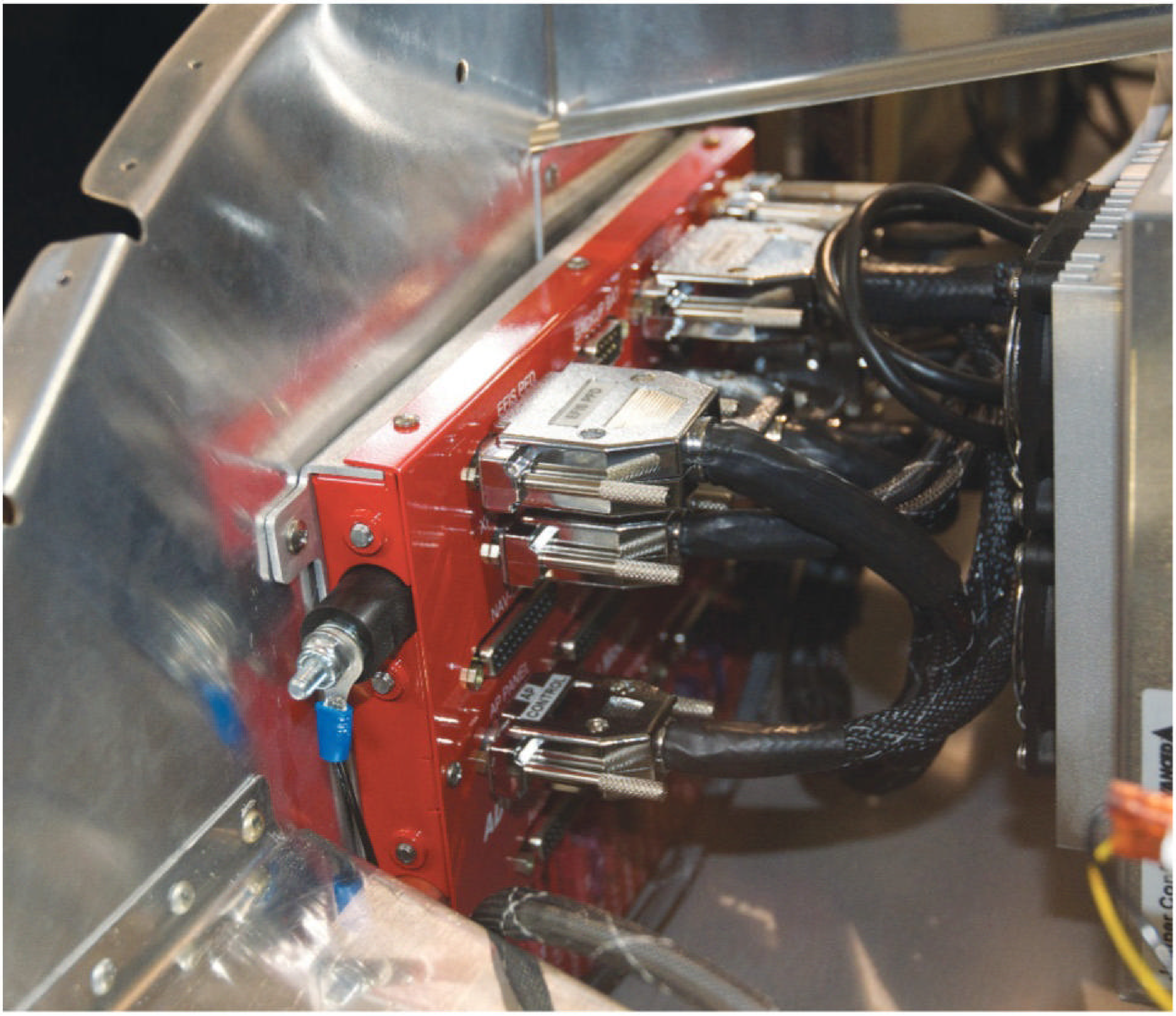
"It is important [that the owner] understands how the systems go together, and what equipment is needed for a given mission, and whether it is a new customer or someone who is making a change to an aircraft."

Dynon's reps are often asked, "What do I need if I am going to (insert mission here)?" Changing a panel from "VFR to IFR is one of the big things people want to know about," says Schofield, because redundancies are needed in an IFR panel. "You want two of everything that matters," he says, explaining that VFR-equipped aircraft may only have one ADAHRS into the display. The ADAHRS module generates data for use by SkyView to calculate the artificial horizon/synthetic vision display, gyro-stabilized heading indicator, airspeed indicators, altitude and vertical speed indicators, slip/skid, turn rate, angle of attack indicators, flight path marker, and winds aloft speed and direction indicators.

For IFR flight, you'll want two ADAHRS, says Schofield. "Or even for VFR cross-country [flight] you would want two, because if one screen goes dark,

DYNON AVIONICS
EFIS-D10A

The Dynon EFIS adds safety and sophistication.



Dynon has a network of authorized facilities that can install its avionics.

the information on that screen jumps over to the other screen." There are also lithium-powered batteries and an option that will give the aircraft approximately 60 minutes of energy to get to the ground.

"We tell them they want a good amount of redundancy, dual displays, and at least one battery backup."

Installation

According to Schofield, Dynon has a network of authorized service centers that have been trained to install the company's avionics. "Homebuilders have been installing our stuff for years. We know that they are A&Ps and IAs, and we know that we built products that people can install for the first time by themselves, because that is how thousands of people have done it already. We make sure you have a qualified installer signed up when you buy from us. It could be a shop or an A&P/IA and on the STC permission statement [for regular type certificated aircraft], which is something you need from us that it will have. [It states] 'this STC can be applied to this airplane, by this AP/IA or shop.'" In that case, says Schofield, the customer is kind of self-selecting who will do the installation, noting that sometimes, these A&P/IAs transition into authorized installation centers.

For owners already under the ELSA category or making the transition to it from SLSA, Dynon builds the panel, the wiring, and the advanced control module, "which is kind of like a harness and power distribution system, as it has electronic circuit breakers and the literally that goes into a box or crate, and it gets mailed to the customer who can then rivet into their panel of the aircraft," says Schofield.

"All they need to do is connect some wires and follow some instructions. Eighty percent of the panel and wiring is complete by the time it gets to them," saving time and energy. ●

Dynon (3)

FLYING'S AIR COMPARE

GRUMMAN AA-5 VS. MOONEY M20 SERIES

Moving four seats from point A to point B as quickly—and efficiently—as possible.

BY JASON McDOWELL

PHOTOS BY JIM STEVENSON

N6816V

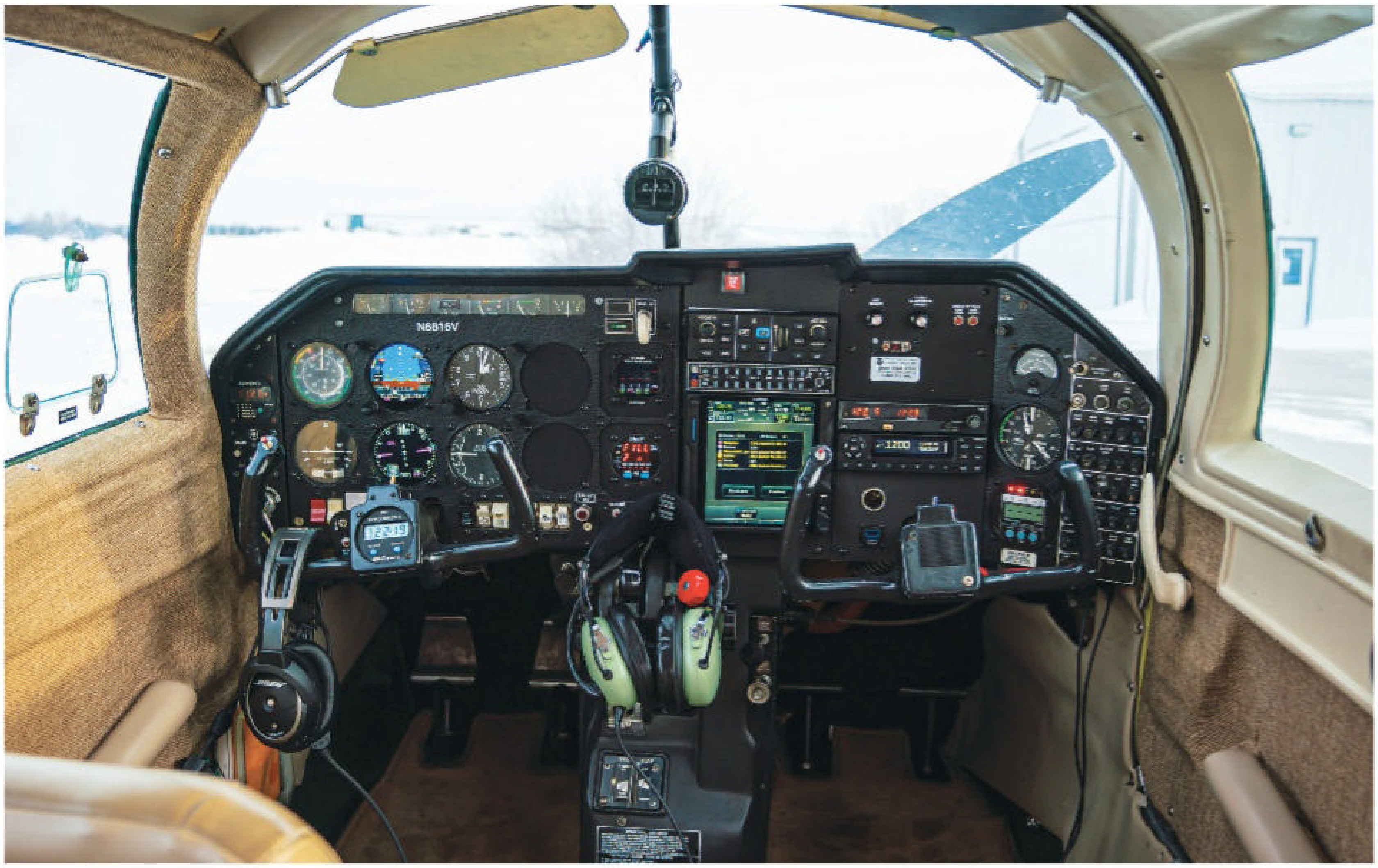
During the 1960s and 1970s, general aviation was bustling. Fuel was inexpensive, disposable income was relatively plentiful, and airplanes were selling well. Bolstered by various wartime production surges, manufacturers were well-equipped to satisfy the market's demand, and competition among general aviation aircraft manufacturers was intense.

Customers in every segment were welcomed with an array of options. A shopper interested in a two-seat trainer would have a variety of choices ranging from fabric taildraggers to brand-spanking-new concepts like the Piper Tomahawk and Beechcraft Skipper. Similarly, a shopper looking for four seats and good cross-country capability had a fascinating variety of models from which to choose.

This four-place cross-country category was particularly competitive. With offerings from Cessna, Beechcraft, Piper, Ryan, Aero Commander, Bellanca, Mooney, Grumman, and others, manufacturers found novel ways to provide solutions to a common mission—moving four seats from point A to point B as quickly and as efficiently as possible.

While many utilized similar designs from similar playbooks, a few took their own paths. Among the more interesting alternatives were Mooney with their M20 series, and Grumman with their AA-5 models. These two families of aircraft utilized completely different airframe construction techniques, vastly different cabin designs, and even differed with regard to fixed vs. retractable landing gear. Yet their missions were essentially the same. Here we explore why one might choose a Grumman AA-5 over a Mooney M20 and vice versa.

Since first built in 1955, Mooney panels vary from one subtype to another, like this M20E updated with Garmin avionics.



DESIGN AND EVOLUTION

Looking at the Grumman AA-5 and the four-cylinder Mooney M20 models, one might infer that the chief designers from each company agreed on very little. The low-slung M20 is equipped with retractable gear, while all AA-5 models utilize fixed gear. The Mooney sported the characteristic forward-swept tail that pivots in its entirety to provide pitch trim. Conversely, Grumman's tail is traditional in both function and appearance. Even access to the cabins is vastly different, with Mooney utilizing a single right-side door while Grumman opted for a large canopy that slides back on rails to provide access from both sides.

Despite the differences, there are some fundamental similarities. The low-wing configuration, for example, four seats, and four-cylinder engines that produce from 150 to 220 horsepower.

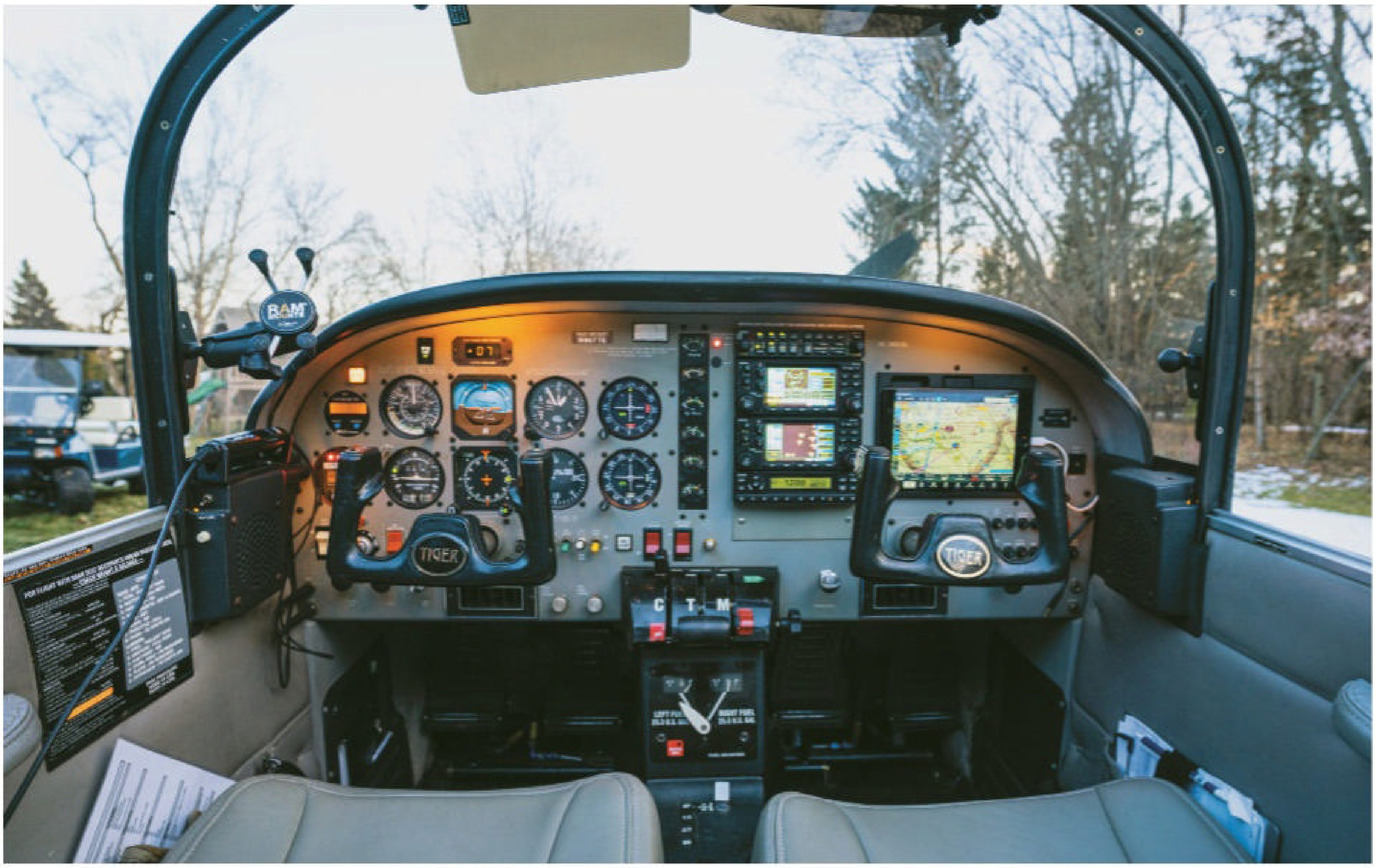
To dig down into specifics and conduct a true apples-to-apples comparison with the AA-5, the wide array of Mooney M20 models offered over the years must be narrowed down. Produced from 1955 into the 2000s, more than 11,000 examples have been delivered, and the wide range of subtypes can be divided into groups based on cabin length.

The M20, M20A, M20B, M20C, M20D, and M20E are the "short-body" Mooneys. The M20F, M20G, M20J, and M20K had an additional foot of fuselage length added ahead of the back seats and are thus known as the "medium-body" Mooneys. "Long-body" Mooney production began in 1988. As the long bodies utilize larger, six-cylinder engines, they are less comparable to the Grumman AA-5 series, and we'll exclude them from this review.

Short- and medium-body Mooney production took place from 1955 through 1998. With a handful of exceptions, the vast majority utilized the Lycoming O-360 and IO-360 engines, ranging from 180 to 200 horsepower. The M20K was the only turbocharged variant among the short and medium bodies and offered 210 to 220 horsepower.

The relative consistency among short- and medium-body Mooneys makes the shopping process fairly straightforward. Many shoppers exclude the M20 and M20A from contention, as these early subtypes incorporated wood construction in the wing and tail. The criteria among the remaining models mostly come down to engines, which typically becomes a choice

Most Grumman panels are laid out in a clean and logical manner, and allow space for avionics upgrades.



between 180 and 200 horsepower. Besides cabin length and the presence of an additional cabin window in the medium-body airplanes, other differences include manual vs. powered flaps and landing gear, and throttle quadrants vs. push/pull knobs.

One notable development was the M20D Master, which came from the factory with fixed, non-retractable landing gear. It was marketed as "convertible" and one could upgrade it to retractable gear. Virtually all have been converted, and only a few remain in their original fixed-gear configuration. While the fixed gear reportedly reduces cruise speed by approximately 25 knots, it would also presumably reduce insurance premiums appreciably.

The Grumman AA-5 Traveler has had a considerably less complex array of subtypes, but was produced under a variety of manufacturer names as ownership of the company changed over the years. Production began in 1971 with the 150 hp AA-5 Traveler. This initial type was produced by American Aviation and later, by Grumman Aviation.

The AA-5A Cheetah was introduced as a 1976 model. Produced by Grumman American and then Gulfstream American, it had the same horsepower but was faster, thanks to drag reduction modifications. Along with all subsequent AA-5 subtypes, it incorporated a larger horizontal stabilizer that expanded the CG range, and fuel capacity increased from 37 to 52 gallons.

For the 1975 model year, the 180 hp Grumman American/Gulfstream American AA-5B Tiger was introduced. In addition to the greater speed and power provided by the more powerful engine, it also introduced a slightly thicker wing spar and a 200-pound gross-weight increase.

Production of all AA-5 subtypes ended in 1979, but between 1990 and 1993, a newly-formed company, American General Aviation Corporation, resumed production of the Tiger as the AG-5B. AGAC modified it with various minor aerodynamic and systems improvements, and built a total of 181. The Tiger was resurrected yet again when Tiger Aircraft produced an additional 51 AG-5Bs between 2001 and 2006.

Compared to short-body Mooneys, medium-body ones provide an added foot of fuselage between the front and rear seats.

The Grumman's canopy slides back for access to the cockpit, and can be left partially open in flight.

MARKET SNAPSHOT

TYPE	NUMBER LISTED	MEDIAN PRICE	MEDIAN AIRFRAME HOURS
Short- & Medium-body M20s	44	$119,000	4,215
Short-body M20s	21	$69,450	4,188
Medium-body M20s	23	$140,000	3,339
All AA-5s/AG-5Bs	20	$122,550	2,970
AA-5	6	$62,500	3,698
AA-5A	3	$79,000	2,621
AA-5B	9	$137,000	2,940
AG-5B	2	$131,925	2,970

A recent survey of M20 and AA-5 variants listed for sale on six of the most popular online classified sites at the time of this writing provides a breakdown of the median asking prices.

One of the most notable takeaways is the consistency in asking prices of the two types. For all of their differences, they still utilize nearly-identical engines to move four seats a similar distance at a similar economy. The market appears to place similar values on this level of functionality.

Predictably, newer models command higher prices and vice-versa. And not surprisingly, the older airplanes generally have a higher number of airframe hours than the newer ones. One anomaly is apparent in the median price of the newer Tigers, although the limited sample size likely plays a role. Also apparent is the massive increase in asking prices post-pandemic. While we did not conduct a comprehensive pricing survey of the M20 family prior to or in the early days of the pandemic, a *FLYING* evaluation of the AA-5 in mid-2020 revealed a median asking price of $48,500 across all subtypes. Today, that figure has increased to $122,500—a 153 percent increase.

The number of active listings for each type reflects production numbers and fleet sizes. With such a lengthy production run, just over 9,000 short- and medium-body M20s have been produced to date. In contrast, only 3,282 AA-5s have been produced in total.

Today, 5,231 short- and medium-body M20s remain active on the FAA registry, compared to 1,839 Grumman AA-5s. This reflects 58 and 56 percent of the original fleet sizes, respectively. This illustrates the greater selection that prospective Mooney owners have compared with those shopping for a Grumman.

Speed mods are available for the Grumman too. This example is stock, while some feature a Lopresti cowl good for 5 mph.

FLIGHT CHARACTERISTICS

The different design philosophies between the Grumman and the Mooney become evident the moment one steps onto the wing to board. Like many low-wing aircraft, admittance to the Mooney is provided via a single door on the right side of the fuselage. Comparatively, the Grumman incorporates a canopy that slides back on rails, allowing occupants to board from either side. When it comes to ease of access, Grumman has the advantage here. If there's a downside, it's that opening the canopy in the rain will expose far more of the cabin to the elements.

Once settled inside, the expansive windows that make up the Grumman's canopy and low sill height provide a spacious feel with a panoramic view. But while the Grumman has an inch and a half more headroom than the Mooney, the Mooney is approximately 1 to 3 inches wider, depending on the specific model and which interior door and wall panels are installed.

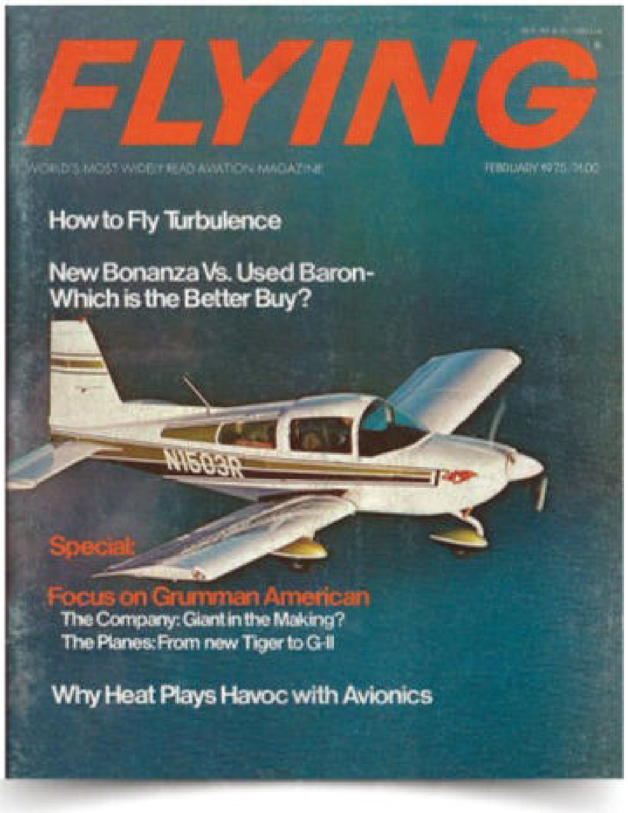
The Mooney's slight lack of headroom can create a marginally more restrictive feeling. Similarly, the Mooney's panel and window sills are higher than the Grumman's, adding to the closed-in effect. Talk to Mooney owners, though, and even those on the taller side report having sufficient space to stretch their legs and get comfortable.

The back seats differ more than the front. Grummans provide backseat occupants with a more roomy environment, and Grumman owners love how easy it is to fold the back seats forward to create a spacious cargo area. With the removal of their front wheels, two full-sized adult bicycles can easily be carried in the back.

The rear seating area in short-body Mooneys is notoriously cramped. Anyone planning to invite an adult to ride there with any regularity would be well-advised to opt for a medium-body Mooney, as the additional foot of fuselage length is placed between the front and rear seats. Mooney owners report no perceptible difference in front-seat comfort between short- and medium-body models.

Another difference arises while taxiing. While the Mooney's rudder pedals are linked directly to nosewheel steering in the traditional manner, the Grumman utilizes a free-castering nosewheel and, thus, requires differential braking to steer and maintain directional control. Critics of this design are quick to mention the increased brake wear that comes from frequent steering inputs and brake applications, but fans counter by touting the ability to deftly pivot into and out of tight parking spaces with little effort.

Takeoff, climb, and cruise performance vary substantially based on specific subtypes. Grumman owners report that the 180-hp Tiger, despite having only 30 more horsepower than the Traveler and Cheetah, exhibits vastly better takeoff and climb performance than the lower-powered versions. Similarly, the performance difference between a 180 hp Mooney with no aerodynamic mods and a 200-plus horsepower Mooney with those mods is substantial.



FLYING

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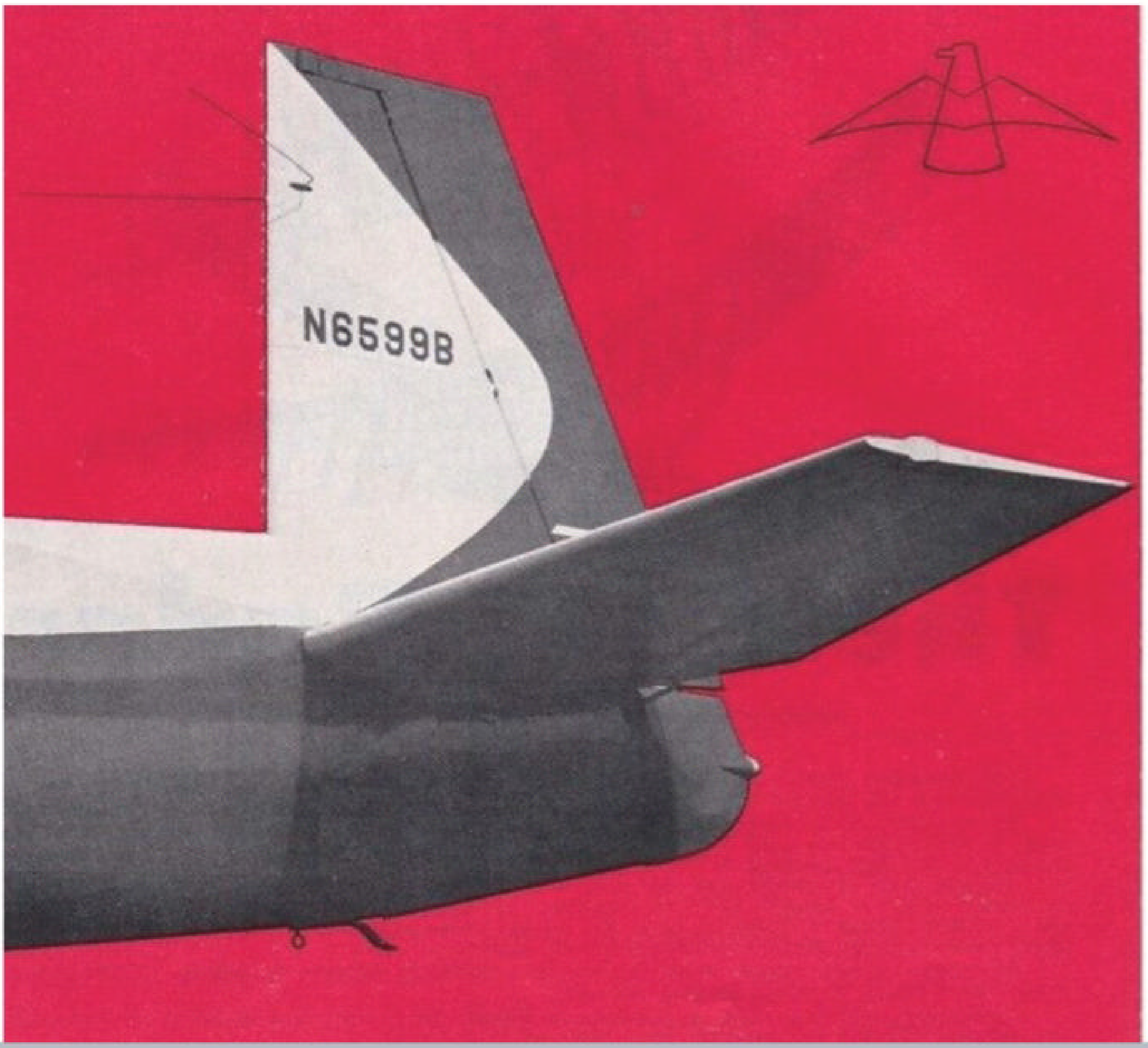
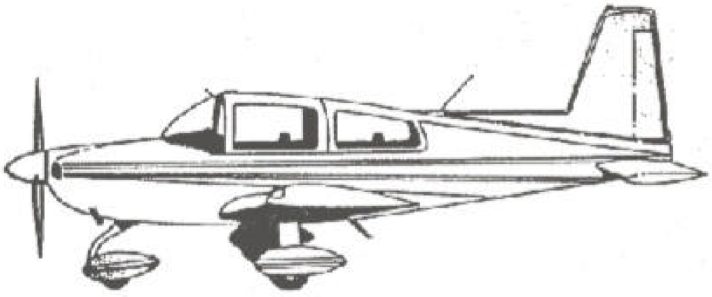


A LOT OF SPEED IN AN ECONOMICAL PACKAGE

FLYING has flown the Mooney M20s and Grumman AA-5s since each model was born. And since that time, we've remarked on how they deliver honest cross-country speed at a price that was relatively easy to accept.

In a March 1997 used airplane report on the M20 series, Richard L. Collins wrote, "In 1963, Mooney tweaked the M20C Mark 21 and added the M20D to the line. Dubbed the Master, it is a fixed-gear airplane with the option to convert it to a retractable. The Master's standard price new was $13,995, and when you got tired of cruising at 140 mph, Mooney would convert the airplane to a retractable for $1,600. Most have been converted...Mooney was selling a lot of airplanes in those days simply because they delivered a lot of speed in an economical package."

The same words echoed in *FLYING's* report on the new Tiger in February 1975. Collins wrote, "If the next era is to be one of efficient simplicity, Grumman American is right on target. The four GA lightplanes...are as basic as they come...[and the Tiger's] 139-knot cruising speed, healthy rate of climb, and good useful load make it a contender in the marketplace..."



Model AA-5B TIGER

1977/1978/1979

We can, however, make a direct comparison by reviewing the published performance data of a 180 hp Tiger and a 180 hp M20C. At maximum takeoff weight and similar environmental conditions, some differences become apparent. The Mooney, for example, provides better takeoff performance, with a ground roll of 815 feet, and 1,395 feet required to clear a 50-foot obstacle. This compares to 909 feet and 1,628 feet for the Grumman, respectively.

Once in the air, the two airplanes return nearly identical rates of climb at sea level—800 fpm for the Mooney and 808 fpm for the Grumman. In cruise, the Mooney's retractable gear provides an advantage in cruise speed, but not as large as one might expect. At 7,000 to 7,500 feet, 32 to 34 degrees Fahrenheit, and 2,700 rpm, the Mooney will reach 146 knots—only slightly faster than the 139-knot Grumman.

In real-world conditions with decades-old airplanes, M20C owners report 140- to 145-knot cruise speeds, and Tiger owners report a range of 125 to 135 knots. Cheetahs are typically about 10 knots slower. On the other end of the spectrum, one M20E owner reports his 200-hp machine with extensive speed mods reaches 155 to 160 knots while burning 10 gallons per hour.

In terms of knots per gallon, both airplanes perform admirably, especially compared to competing types. At the commonly-reported figures of roughly 135 knots and 9 gallons per hour, the Grumman Tiger boasts 15 knots per gallon of fuel burn. At an additional 10 knots with the same fuel burn, many M20C owners see that figure rise to 16.

While a new owner of either airplane would be wise to obtain flight instruction from an instructor intimately familiar with the type, Mooney owners are quicker to warn newcomers to the peculiarities of the M20, emphasizing precise airspeed control on final. The airplane is particularly unforgiving of being forced onto the runway before the wing is finished flying. In an attempt to avoid pilot-induced oscillations, one Mooney training curriculum strongly warns against attempting to salvage a bounced landing, and recommends initiating a go-around on the first bounce.

The Mooney requires more runway distance for landing than the Grumman, with a 595-foot ground roll and a 1,550-foot distance over a 50-foot obstacle listed in the book. This compares with 415 feet and 1,135 feet for the Grumman. This may be partially because of the Mooney's 69-knot approach speed, which is 6 knots faster than the Grumman.

Valuable as raw numbers may be, Grumman fans tout some of the less-quantifiable characteristics and features of their beloved airplanes. All AA-5s, for example, can be flown with the canopy slightly open. On the ground, it may be opened up completely for a refreshing blast of cool air on hot summer days.

Grumman owners also rave about their airplane's handling characteristics. Control forces are notably light, requiring only slight fingertip pressures to maneuver as desired. The M20 series provides accurate, predictable handling as well but is noticeably heavier on the controls. This may appeal to instrument pilots with a preference for hand flying. Both airplanes utilize torque tubes and push/pull rods, providing a more precise connection to the ailerons than traditional cables.

According to the books, the M20C has a useful load of 1,050 pounds, slightly more than the Tiger's.

OWNERSHIP

A thorough pre-purchase inspection by an experienced A&P is critical for both the AA-5 and M20 series. In addition to the usual threat of corrosion in aging aircraft, attention is prudent in areas unique to these types.

Although the Mooney is traditional in many respects, there are a few concerns. Mooney service bulletin M20-208B, for example, recommends a thorough annual inspection of the steel frame surrounding the cabin to determine whether any corrosion is present. As this check is not mandated, some owners might not perform it annually as recommended.

The nose gear is another critical check for the Mooney. The structure has strict tow limits, and if an unaware line worker attempts to turn the nose gear too sharply in either direction while towing, structural damage can occur that requires a rebuild to the tune of several thousand dollars. A careful visual inspection determines whether this damage is present.

Mooney fuel tanks are known to develop leaks. While they can be resealed, fuel bladders are a popular modification providing a more permanent solution. And although the Mooney's landing gear lacks more complex air shocks or oil damping, the manufacturer does recommend replacement of the rubber shock absorber pucks every 8 to 10 years at a current cost of approximately $2,000 for the pucks themselves, before labor.

The Grumman has its unique pre-purchase and ongoing maintenance considerations. Early AA-5s developed problems with airframe bonding failing and resulting in delamination. Fortunately, most that have experienced the problem are thought to have been identified and permanently fixed. It remains important to have this confirmed by an A&P familiar with the issue.

Simple as the Grumman's landing gear is, particularly compared to a retract, it has unique maintenance needs. The nose gear utilizes a design that should be thoroughly inspected prior to purchase and then at every annual. Grumman maintainers report that this item may be skipped or completed in an insufficient manner, resulting in pricey repairs down the road.

If how an airplane looks translates directly into speed, it's no wonder the M20 series edges out the Grummans in this way.

AA-5 wing spars are life-limited to 12,000 to 12,500 hours. Few AA-5s are approaching this amount of use, and the median airframe hours among the examples listed for sale at the time of this writing were less than 3,000. Anyone considering a particularly high-time AA-5 would be wise to take it into consideration.

The Grumman is otherwise a straightforward airframe design. Unlike most comparable aircraft, there are no moving parts inside an AA-5's wing—all flap and aileron actuation is achieved via easily accessible torque tubes, upon which each control surface pivots. One maintainer points out there are fewer moving parts in an AA-5 than in a Cessna 150, and another enjoys how all flight control cables are neatly located in the center of the aircraft and are rather short.

Otherwise, no airworthiness directives (ADs) make ownership burdensome for either airplane. All tend to be one-time or recurring ADs that are straightforward to address. The Mooney owners we surveyed report uneventful annuals at $2,500 to $3,000. Grumman owners report a range of $1,500 to $2,500.

Insurance cost is one element of ownership in which the two types differ substantially. To compare the two types, we asked an insurance broker to create quotes for a 40-year-old private pilot with no instrument rating, 250 hours total time, and 5 hours in type. For a 1977 Grumman Tiger valued at $110,000 and liability limits of $1,000,000/$100,000, this theoretical pilot could expect to pay roughly $1,900 per year. For a 1969 Mooney M20C with the same hull value and liability limits, they could expect to pay roughly $6,000 per year.

If this pilot obtained an instrument rating and 1,500 hours total time with 25 hours in type, they could expect to pay roughly $1,500 per year for the Grumman and $4,000 per year for the Mooney. That makes the Mooney nearly three times as expensive to insure—an added $208 to $341 per month over a year in this case.

Both models are well supported by active and bustling owners' groups. The Grumman Owners and Pilots Association (grummanpilots.org) is the original type club for the Grumman. It holds regular events including an annual convention, and offers a pilot familiarization program for new Grumman pilots.

The Mooney Aircraft Pilots Association, or MAPA (mooneypilots.org), is a valuable resource for Mooney ownership information. Additionally, Mooneyspace.com is an active forum, and Mooneysafety.com offers training resources and proficiency programs.

OUR TAKE

In aviation, speed costs money, and diminishing returns approach quickly. When operating with a modest budget, the M20 and AA-5 series provide what might be the greatest-knot-per-dollar among four-place certified aircraft. Other types might offer more speed, but at the cost of six-cylinder fuel burn. Others might be less expensive to purchase and operate but will likely fall short in cross-country traveling ability.

Both the Mooney and Grumman seem to provide a nice balance of speed, operating economy, and ease of ownership. Without any overly difficult-to-source airframe parts, massive ADs, or orphaned engines in the equation, both types offer a compelling solution for longer-distance travel without an overly-burdensome ownership experience.

Perhaps best of all, both types are enthusiastically supported by vibrant owners' groups. For a nominal annual fee, a new owner can unlock a level of support, expertise, and camaraderie that owners of less-common types can only dream of. Whether a buyer opts for the M20 or the AA-5, it's a safe bet they'll enjoy their purchase for many years. ●

DESTINATIONS

CAPITAL REGION

An Air & Space mecca that's easier to reach than you think

BY JONATHAN WELSH
IMAGES BY STEPHEN YEATES

After years of considering a springtime flight to Washington, D.C., I think I am finally ready to go. And let's make it soon, because more so than usual, time is of the essence.

One of many attractions the nation's capital is famous for is its spring cherry blossoms and a range of other beautiful blooms. And this year, reports from the *Washington Post* and *Guardian* newspapers—and even the groundhog Potomac Phil—indicate spring has arrived early this year.

I would like to catch the seasonal palette at its peak, but even if I miss the color splash, there is still so much to see in Washington that planning a GA flight and perhaps an overnight stay is easily worth the effort. The emphasis is on planning. The D.C. airspace has its particular complexities, with several rules and procedures pilots must observe—and the consequences for violations range from warnings to certificate suspension. But there's no reason to fear the area.

As long as you communicate properly with ATC and get the necessary permissions before entering controlled areas, you should be fine. The system is designed to keep you in the right place, so relax, talk to the controllers, and follow their instructions. They are trying to make your trip as safe as possible. Besides, I like to think there would not be more than a dozen GA airports within the Special Flight Rules Area—the DC SFRA—if we were not meant to fly there.

NOT LIKE OLD TIMES

Flying around D.C. this spring will mark nearly 35 years since the last time I flew there, while taking my first round of flight training after graduating from college in 1988. A longtime family friend, CFI, and FAA employee offered to give me a week's worth of lessons as a graduation gift—one that seems more generous with every passing year. He intended to send me home with the hours and proficiency I needed to solo.

His flying club was based at Leesburg Executive Airport (KJYO), and we spent most of our time flying between Leesburg and Frederick Municipal Airport (KFDK) with regular stops at a few smaller fields, including Sky Bryce (VG18). One day, we were departing Leesburg, climbing at 80 knots or so, when I looked up through the Cessna 152's scratch-worn windshield to see Concorde perhaps 2,000 feet above us. They operated from nearby Washington Dulles International Airport (KIAD) back then. It was climbing, too, at an impressive rate. Indeed, Concorde's ascent was so steep that it eventually disappeared not into the distance ahead, but into a high overcast instead.

Leesburg and Frederick were not busy then, nor were they towered at the time as they are today. This was also decades before the SFRA and the Flight Restricted Zone, so other than staying clear of the Dulles section of the Class B airspace, navigating was clear.

Since September 11, 2001, the D.C. airspace has grown more complicated and even daunting to many GA pilots. Some simply avoid flying anywhere near the District, fearing missteps that could result in reprimands from ATC, interception, or worse. However, there are procedures for flying into skies around the Capital, and while they require additional planning and attention, they are not difficult to understand. Indeed, getting accustomed to its operations is worthwhile for pilots who would like to visit D.C.

While the average GA pilot can no longer fly into KDCA, it offers excellent locations for planespotting.

American Eagle

The museum at the College Park Airport shares the field's history, which includes early Wright Brothers aircraft.

GETTING THERE

Flying into the Capital region can be much like your typical GA trip or something more challenging, depending on how close you wish to get to the center, which for pilots is the VOR/DME at Reagan Washington International Airport (KDCA). Around the center are roughly circular rings with radii of 60 and 30 nautical miles, and a more irregular boundary stretching about 15 nautical miles from the VOR. Think of these as denoting increasing levels of difficulty. Pilots must complete an online course to fly VFR within the 60-mile radius.

The area between the 60- and 30-mile rings is easy. All pilots have to worry about is a speed limit of 230 knots indicated. The 30-mile ring marks the SFRA boundary. You need a SFRA flight plan on file, then radar contact and two-way communications to enter. The SFRA is also divided like a pizza, with the crust of each slice denoting a gate—each with a name from a local intersection—and you must include your planned entry and exit gates in the flight plan. When you file the plan, you will also receive a transponder code for the flight within the SFRA.

This may sound like a lot to remember, but once you are underway and talking with ATC, you mainly just need to fly and listen. For many pilots, entering the SFRA is worth the extra effort because there are several airports within it that offer easier access to Capital attractions through proximity to public transit. One note: often, you will be cleared into the SFRA but advised to stay clear of the Class B. This may put you below 1,500 feet msl in some sections.

The degree of difficulty rises if you want to enter the FRZ. There is paperwork for pilots, including background checks. Getting permission used to be difficult for pilots who have not been based at one of the three GA airports within the FRZ, known as the DC-3. These are College Park Airport (KCGS), Potomac Airfield (KVKX), and, up until recently, Washington Executive/Hyde Field (W32)—which closed permanently as of November 2022. However, that policy changed about 15 years ago, and now the process for getting what's known as a PIN is straightforward and can typically be processed within a few weeks.

Once you've decided to go through the process, College Park probably is the most tempting, because it has a Metro station that makes getting to the city a breeze.

How you get into the D.C. area might ultimately depend on how ambitious you feel that particular day. There are certainly enough airports outside the SFRA that have rental car desks if you're not feeling intrepid. But flying is a wonderful thing, and the closer you get to D.C., the more you're going to be glad you are not driving.

THINGS TO DO

The National Mall will always be my starting point for exploring the Capital. As a six-year-old, I played soccer and flew kites there while visiting cousins who lived in the city. Years later, during a memorable eighth-grade field trip, my classmates and I played ultimate frisbee and flew model airplanes across the street from the Smithsonian National Air and Space Museum, where we had purchased them in the gift shop.

The Air and Space Museum, a perennial magnet for pilots, reopened last October after a monthslong renovation. For those who have not visited lately, a visual experience that was largely unchanged since the museum opened in 1976 will be completely new, and even more of a must-see on the lists of aviation fans. Private pilots should feel particularly welcome in a new section devoted to general aviation.

The classic Washington points of interest still beckon, including the United States Capitol, Library of Congress, National Portrait Gallery, Washington Monument, Lincoln Memorial, Jefferson Memorial, Smithsonian National Museum of Natural History, National Museum of African American History and Culture, National Gallery of Art, Smithsonian National Zoological Park and the Vietnam Veterans Memorial, to name just a few.

Visitors have the option of numerous bus, van, and walking tours, including many that bundle attractions based on certain themes. These often make it possible to see more in a day than most people could orchestrate on their own. I find that distilling the itinerary to a short list is the best strategy, and walking is often the best way to get around. To speed things up and cover more ground, consider the Capital Bikeshare program.

For me, the list is down to one destination: the Air and Space Museum's Steven F. Udvar-Hazy Center, located near Dulles airport. I have somehow failed to visit the "new" museum for the last 20 years since it opened, and there are numerous aircraft there that I want to see up close.

Another aside: During the 1980s, my radio-controlled model airplane club organized a series of field trips to the Paul E. Garber Facility, the former center of restoration and preservation activity for the Air and Space Museum. You could book group tours of the workshops and storage buildings there, which were stuffed with all manner of aviation treasures. There were rare airplanes, of course, but also fabulous esoterica, like the enormous single wheel and tire from the original main landing gear of a B-36 bomber. Convair soon switched to a multi-wheel setup to better distribute the aircraft's weight and avoid destroying runway pavement.

Today many of the aircraft I saw stashed in dusty corners or in pieces, like the German Arado Ar 234 twin-engine jet bomber from World War II, are restored and in the museum. The prospect of finally seeing this part of the collection had me considering what would be my first landing at a Class B airport: Dulles, mainly because one of the FBOs there runs a free shuttle to the museum, which is just outside the airport property.

Then a friend suggested Manassas Regional (KHEF), which is also close to the museum, has easy access to rental cars and a regional train station, with lower airport fees and less congestion.

I think I need to amend my flight plan. ●

The timing for your visit to catch the cherry blossoms coming alive near the Mall changes every year—so plan early.

CHANTILLY AIR
RAILWAY EXPRESS
VIRGINIA
BOEING
N707

Top right;lower left: KHEF offers a great FBO and train service; it's close to the Hazy (middle; bottom right).

915 iS

THE EPITOME OF COOL

Turbochargers boost power within safe limits—as long as you treat them with care.

BY RICHARD SCARBROUGH

IMAGES BY LEONARDO CORREA LUNA & LYCOMING

The Lycoming TIO-540-AK1A is one common turbocharged engine, found in airplanes like the Cessna T182T.

TURBOCHARGERS ARE THE epitome of cool. Early in the 1960s, Oldsmobile had the first production turbocharged automobile, the F-85 Cutlass with a Garrett AiResearch turbo dubbed the Turbo-Rocket engine and marketed as the Jetfire.

The 1979 Porsche 930 Turbo, one of the first production street cars to experiment with turbocharging, was an icon for the era. Many of my friends had posters of them, in fact. 1986 found me cruising the streets in my 20-year-old Ford Fairlane (normally aspirated), blaring Judas Priest "Turbo Lover" on a cassette tape deck in the dash.

In all honesty, I should close out this article right here, as whatever I write next cannot compare to rolling through the Big Star parking lot and turning up Judas Priest.

COMPONENTS

The components of an aircraft turbocharging system are the turbocharger, throttle body, intake manifold, exhaust manifold, air intake, wastegate, and exhaust. The turbocharger assembly has three main components: the turbine that receives gases from the exhaust, the compressor that takes intake air, compresses it and drives that into the cylinder—and a shaft connecting the two.

The turbine is the driving force behind the turbocharging system. Exhaust gas from the manifold causes it to spin; this is the residual that bypasses the wastegate.

Connecting the turbine and the compressor is the turbine shaft. This solid metal connector ensures the compressor spins as the turbine spools up. Turbocharger shafts require proper lubrication and often fail if they are starved of oil.

The compressor delivers compressed air to the intake side of the cylinder head. Driven by the turbine by way of the shaft, the compressor spins in unison to complete the job started by the exhaust. This increase in air pressure through the intake is known as manifold pressure. As with many things in life, you can have too much of a good thing. Your engine cannot always handle excess manifold pressure, and it can cause severe damage.

The turbocharging system accounts for unneeded or unwanted pressure through the wastegate. This process can either be automatic or manually actuated by the pilot from the cockpit. In either case, the mission is to dissipate exhaust gas before it enters the turbo unit, spinning the compressor faster and harming the engine.

The baseline operating parameter for reciprocating engines is at sea level. This is also where your powerplant produces the most power. As an aircraft increases in altitude, pressure and density inversely decrease, causing power to decrease.

Turbocharged engines operate at much higher pressures and temperatures than their normally aspirated counterparts. Many reciprocating aircraft need a turbocharger for high-altitude flying. If not properly maintained, this can cause additional strain to your exhaust system.

Some also bleed air from the turbo systems to pressurize aircraft cabins.

I recently spent some time with Tim Gauntt, director of product support at Hartzell Engine Technologies, LLC (HET). He was kind enough to pass down some knowledge concerning turbocharger systems.

One topic we covered: how and to what extent pilots should run "lean of peak" (LOP). How does this affect the turbocharger and components for specific aircraft? The turbocharger is rated for a specific temperature, typically based on the turbine inlet temperature (TIT). The turbo is within its standard operating range if that temperature is not exceeded.

Lean of peak is a relatively new operating range, as there was no way to determine this before the engine analyzers were available. In times past, you leaned to a safe turbo TIT operating temperature as had been established by the OEM. As a reminder, all engine operations should comply with manufacturer recommendations. They are the experts. This practice is standard for Continental, Lycoming, and other OEMs like Rotax.

With all the talk of LOP operation and how it might affect the turbo system, the most common question asked is about turbocharger cool down, which is an operating parameter that can be controlled and will directly affect the longevity of the turbocharger system.

There are three things to consider. Are you operating a boosted engine system or a normalized system? Is this a 400 series AeroForce (Garrett, AiResearch, Honeywell) turbo or a 600 series AeroForce (RAJAY) turbo? And what type of pilot is flying the equipment?

Again, rule number one is the OEM recommendations should be followed on turbo cool down. In some cases, that information is hard to find. The Cirrus SR22T pilot operating handbook (POH) does not address cooling down the engine's turbo components. However, the Continental engine operating manual for the installed TSIO-550-K powerplant has a specific procedure.

Boosted engines create boost and heat at any altitude, including at sea level. Because of this, they are the most susceptible to damage resulting from an inadequate cool-down. A normalized system doesn't begin boosting until the aircraft gains altitude. Logically, the turbo is "off-line" on descent after reaching that same lower altitude.

The 400 series turbocharger unit uses iron to manufacture its center housings. Because iron does not dissipate heat quickly, the 400 series turbos are more susceptible to cool-down damage than a RAJAY-style turbo that uses an aluminum center housing. The aluminum dissipates heat quickly. Because of this, the HET overhaul manual states that no cool-down time is required on RAJAY turbocharged engine.

Aviation has a wide variety of operators. Some fire up the engines and taxi out without flight planning or monitoring the engine temperature. Others are very attentive to the equipment, as it can be pricey. They have a reasonable flight plan, monitor engine gauges, adjust cowl flaps—even if speed is reduced—and will sacrifice additional fuel flow for extra cooling.

As a side note, AeroForce, a HET company, recently accepted a purchase order from Textron Aviation authorizing the manufacture of Cessna part number C295001-0203 turbocharger for the Cessna 210 model aircraft with TSIO-520-CE powerplants. This turbocharger was unavailable for years, and as a result of this Textron Aviation partnership, new turbochargers will be available again sometime in the future.

BRISTELL
BOSCH
915 iS

Turbocharged aircraft are more complex than normally aspirated engines, but that does not mean you have to be afraid of them. As with anything aviation related, the care you put into the component dictates the performance you receive in flight. The key is attention to detail. Even the slightest oversight can have disastrous consequences.

I recall during my engine shop tenure the former owner working through an incident just before we acquired the business. His team tended to a Lycoming TIO-540-J2BD engine out of a Piper Navajo. Shortly after, the aircraft was at altitude, and the pilot noticed flames coming from the right-side engine cowling. The pilot had many hours in this airframe and shut things down immediately. During the investigation, the team found a hairline crack in a blue aluminum 45-degree elbow fitting. There is nothing like having fuel spray directly on hot engine components. A $20.00 part almost took down a quarter-million-dollar airplane.

It is easy to see how the mind can race when discussing the inner workings of aircraft. Every part must perform to exceptionally high standards. The stakes rise when introducing turbochargers to the mix. It is mission critical to identify the warning signs when things start to go south. What are some things to be aware of if you have concerns? Erratic system operation can be attributed to carbon deposits in the wastegate valve, also known as coke build-up. If left untreated, this could over-boost the engine due to the wastegate sticking closed. Excessive coke build-up in the turbocharger assembly often results in a low manifold pressure indication during takeoff and a loss of power.

While carbon deposits are common in turbocharger squawks, other contributing factors may also be present.

As an engine shop owner, I outsource my accessory work to several shops. As I have stated, it is better to leave component work to the experts. Please source from only Part 145 certified repair stations. One repair station I dealt with is Approved Turbo Components (ATC) in Vero Beach, Florida. Jeff Newbold from ATC has some great intel on troubleshooting turbocharger systems.

I asked Newbold what common failures he saw at the shop with turbochargers and turbo components. He replied that one of the most significant issues is dealing with high-time units. Often, operators run their systems past recommended time between overhauls (TBO), which can spell trouble.

Another issue is oil starvation and contamination. These components spin at high rpm and need ample and clean oil to keep them in shape. Oil leaks because of other causes are also common. Pay close attention to check valves, scavenge pumps, and dirty air filters. Also, be mindful of high crankcase pressure. Check approvedturbo.com for an Oil Leak Troubleshooting Guide. Foreign object damage (FOD) is also a constant threat.

Is there anything pilots can do in flight to help preserve their turbo system? A five-minute engine cool-down does wonders for keeping carbon deposits from building up in the bearing housing. Be careful when leaning the fuel mixture. Extreme leaning can increase the turbocharger temperature, decreasing the components' lifespan. Also, avoid rapid throttle movement to prevent thermal shock to the turbo. Doing so will prevent premature housing cracks.

Follow OEM guidelines as the baseline for your maintenance plan. One excellent resource is Kelly Aerospace Service Bulletin SB 23. After replacing a turbocharger, consult SB 23 to walk through the operational test. Troubleshooting turbo system problems before replacing them could save time and money.

One takeaway you can focus on when maintaining turbo systems: The first line of defense is a visual inspection. When checking the turbine and compressor blades, look for damage, abnormal wear, or discoloration. As you go over the entire system, check all bolts and lock plates. Pay particular attention to the bearing housing shoulder in the turbine housing.

You can check radial and axial play by lifting and pressing down equally from both ends. Only checking from one side gives a much larger result. It is imperative that you pre-oil replacement parts.

Gary Main, president of Main Turbo Systems, Inc., in Visalia, California, publishes technical briefs to inform the flying community on specific issues pertinent to turbocharger systems in aircraft. One such article, "Maintenance Tip #15," deals with oil leaks, one of the most common issues facing turbocharger systems. There is a misconception that turbo-bearing housings are designed to fill with oil for lubrication. This is incorrect. As the oil enters the bearing housing, it automatically enters an oil galley and is directed down into the bearing housing. The oil is then directly fed into the main bearings. The article specifically details tips and knowledge not found in many manuals.

"Maintenance Tip #15" relates to engine pre-oilers and turbochargers. In the scenario detailed within, excess pre-oil entered the turbocharger, causing it to mimic a leak. Once the engine started, the engine-driven scavenge pump kicked in and removed the oil.

Main Turbo also has a specific bulletin on bearing housing to turbine housing clearance—"Maintenance Tip #11." One complaint: air is escaping. This situation gives a false indication of a blown-out gasket or seal. In reality, there is no gasket in this area. The seal is made when the bearing housing and heat shield are seated down into the turbine housing and properly torqued.

The Rotax 915iS represents a new line of turbocharged engines that suit the light sport market.

AFTER MARKET

Not every turbocharged aircraft you encounter in the field was delivered from the factory that way. Aftermarket companies produce turbo solutions for legacy platforms and the aftermarket. Aircraft can be altered to accept an aftermarket turbocharger through the supplemental type certificate (STC) route.

One such company offering STCs is RAJAY Turbo Products, which it makes available for Beechcraft, Cessna, and Piper aircraft, to name a few. A complete list of their STCs can be found at rajay.aero. According to their website, an A&P can install a RAYJAY kit in approximately 70 hours per engine.

Tim Roehl, president of Tornado Alley Turbo, Inc., had a few points to add about turbonormalizing, which converts aircraft engines from normally aspirated to turbocharged.

The upgrade provides the same 29 or 30 inches of manifold pressure that's available at sea level. Turbonormalization takes advantage of the higher compression ratio, better thermodynamic efficiency, and higher intercooler efficiency. The result is cooler cylinder head temperature, exhaust gas temperature, and TIT. Additional benefits include better fuel economy and extra power—as horsepower is not shed with heat loss—allowing the aircraft to operate more efficiently.

Maintenance of your turbocharging system is paramount in the care and keeping of your aircraft. Failure to do so would spell disaster for the aircraft powerplant and could result in an incident at altitude. Follow the OEM guidelines.

Check in with your maintenance provider. Only use certified resources, consult technical publications, and resist cost savings measures that cut corners.

RICHARD SCARBROUGH is a U.S. Navy veteran, A&P, and Embry-Riddle Aeronautical University graduate, with experience ranging from general aviation to airliners.

THE ONE THAT GOT AWAY

A Fairchild 24 flies off after its restoration—only to return 19 years later.

STORY AND IMAGES BY LEONARDO CORREA LUNA

Eight years ago I bought my first airplane, a beautiful classic 1952 Cessna 170B. That airplane had to have these features: a tailwheel, four seats, four hours of endurance, easy to maintain—and needed to be classic and beautiful. My budget in 2014 was $50,000. The final list included the Cessna 170 and the Stinson 108, and another model that caught my eye—the far less common Fairchild 24.

As I mentioned before, one of my requirements was that my future airplane needed to be beautiful, which for me left the 108 off of my list. I know, I know: "Beauty is in the eye of the beholder." But that left my final decision between the 170 and the Fairchild.

The dictionary defines beauty as "a combination of qualities, such as shape, color, or form, that pleases the aesthetic senses, especially the sight." And for me, that is a Fairchild 24.

The Fairchild 24 was an evolution of the Model 22. The 22 had two seats and an open cockpit in a mixed-construction, braced parasol-wing monoplane. The 24 has a closed cabin, and it initially came with two seats that eventually evolved to a four-seat configuration. The first year of production was 1932, and it would continue in production until 1948, basically unchanged.

It was initially offered with two primary powerplants: the well-known and reliable Warner Scarab with 145 hp (later 165 hp) and the 200 hp Ranger. However, with the Warner, the beauty factor kind of disappears for me. The proportions are wrong—the nose looks too short, and the rest of the fuselage is too broad. The opposite happens when you see the 24 with the stylish long nose hiding the 200-hp Ranger.

Probably the most charismatic characteristic of the 24 is the landing gear—it is much wider than other airplanes of its category. Spring-oil shock absorbers extend several inches and connect with the wing struts and the front spar, creating a robust structure—and enabling softer landings.

The cabin and wings are made of wood. The wing connects with the fuselage with a beautiful gull-wing shape. Behind the main cabin, the fuselage is made of steel tubes. To add to the mix of wood, fabric, and steel, the ailerons are aluminum.

My first contact with a Fairchild 24 was during Oshkosh 2013. It is easy to confuse the Warner radial version with a Stinson Reliant or Howard DGA—they feature a similar style, but not the ones equipped with the inverted inline Ranger. One of the 24s was particularly gorgeous. Bright yellow and emerald green, it represented a perfect restoration—probably better than the day it left the factory. I didn't know then that years later I would become a neighbor of that magnificent 24.

In the end, my decision leaned towards the Cessna 170, but I always felt like the 24 was the one that "got away." I kept checking them yearly at Oshkosh, chatting with the owners, and was always tempted to add one to my life.

Fast forward to 2021, when I moved my 170 from California to Poplar Grove, Illinois, just outside Chicago. To me, Poplar Grove (C77) is the most beautiful airpark you can imagine, especially if your passion is vintage airplanes. A few days after I moved in, I saw my favorite yellow-and-green Fairchild 24 taxiing by. I quickly found that Lon Dietz was the current caretaker, and after a quick call, he agreed to share his story.

In 1998, a photographer in the area gave him a photo he took of the 24 Lon now taxied by in. That photo remained on Lon's fridge for the next nineteen years. The day he entered the house after bringing the airplane back to Poplar Grove, he walked into the kitchen, took a look at the photo on the fridge, and told himself, "Now I know why that photo has been there for the past nineteen years." So how did that happen? It's a great story.

A combination of tubes, wood, fabric, and aluminum. An unusual fuselage shape with a hump. Wide, tall landing gear and a birdcage windshield all come together in a weird way that pleases the eyes.

NC2868

THE FAIRCHILD'S STORY—AND DIETZ'

Sixty-seven-year-old Lon Dietz, a native of northern Illinois, has been living at Poplar Grove for the past 18 years. He learned to fly at Rochelle Municipal Airport (KRPJ) in 1974 when he was 18. Or, as he tells me, "I got my pilot license in a Grumman Yankee, but later I learned to fly in my first airplane, which was an Aeronca Champ that I bought for $3,500. After that, I upgraded to a Citabria and later to a Pitts. And I sold the Pitts to buy the [Fairchild]."

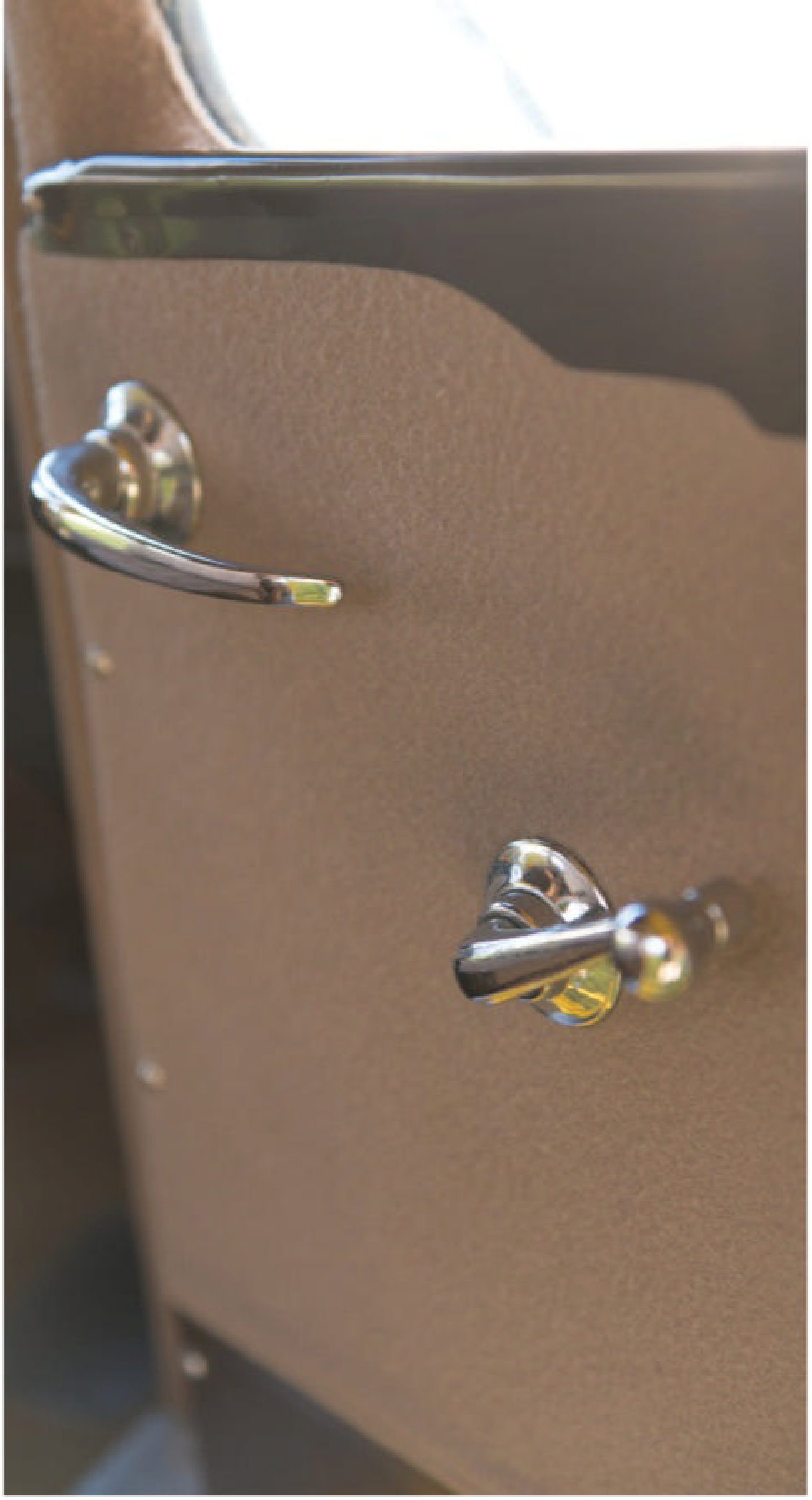
The Fairchild was a 1940 F-24 W40, the "W" meaning it left the factory with a Warner engine on its nose. At some point in the 1950s, somebody swapped the Scarab for the Ranger engine. The 24 belonged to the New House's Flying Services, and it had seen better times. It was basically abandoned and run down, and lay partially assembled in a barn, with the engine off. So why sell a perfect Pitts to buy a basket case? "Well, I wanted something different. Also, I wanted a project, and boy, this was definitely one!"

After extensive work, Lon put the 24 together and flew it for ten hours, but it was clear that it needed a full restoration, and that is what he did for the next seven years. In 1997 the 'Pegasus' got his wings again, and one year later, Lon took the airplane to Oshkosh, where it won "Outstanding Cabin Monoplane." After five years of flying it, the itch for a new project was growing, and after finding a Staggerwing project, Lon decided to call a collector who had it in his sights to transfer ownership. This would be a decision that he quickly regretted. Nineteen years later, Lon got a call from a friend in Houston, Texas: "Hey, I think the airplane you restored is for sale!" A quick call later to confirm it was the same airplane, and Lon struck a deal over the phone to be once more time the caretaker of the 24. That was in 2020.

After our photo shoot for these pages, Lon asked me if I wanted to fly it. After a quick briefing on the gray autumn day at C77, I turned the Plymouth handle to open the door and climbed in using the Art Deco step with the Pegasus Fairchild logo.

I have flown 40 different types of airplanes, mostly vintage, a few warbirds, and more or less all feel the same when you sit. Some have better or worse ergonomics, and usually the field of view is restricted in vintage taildraggers, but the Fairchild 24 is definitely different. The panel is far away and low. The stick is curved and big, and the three-piece windshield allows for good visibility thanks to the streamlined shape of the Ranger engine. There is an almost comic feeling to how you sit; it takes a few minutes to get used to.

Starting the engine is standard; the Ranger starts without hesitation in the cold morning air and runs smoothly. Taxiing is easy, with some tapping on the brakes needed for the tight turns, and while you can see forward through the front lateral windows, S-taxiing is still necessary to be sure nothing lies straight ahead.



Opposite: The Fairchild 24 looks like an airplane designed by a French or Italian engineer—it looks fast just sitting on the ground. Above: Like many other airplanes from that era and later decades, the 24 uses many components readily available from the auto industry. Two radiator caps from Chevrolets are used to keep the 60 gallons of fuel inside two tanks. Ford handles to open the doors, and Plymouth provided the handles to crank the windows up and down.

MY FIRST FLIGHT

After the standard run-up check, we took the grass runway, heading to the west. I slowly added power while increasing the right rudder pressure. The 24 was easy to keep in the center of the runway. The speed started to increase, and when I felt the tail becoming light, I gave positive forward input to the big S-shaped stick. The tail came up, and the oil-filled gear smoothed over all the imperfections of the runway like a big classic American car.

We became airborne, and I pitched down to increase the speed to 80 mph, which is its best rate of climb. It's a chilly day, and that helped with the climb rate. With two big guys on board and full tanks, we are still doing close to 1,000 fpm. There was something besides the cold temperatures and the 200 hp of the Ranger helping us to climb. This airplane is equipped with a rare Aeromatic wooden propeller.

The Aeromatic prop allowed the engine to develop full horsepower for takeoff, climb, and cruise. After fully pushing the throttle forward for takeoff, the engine revved up to about 50 rpm under the red line. When airborne and with the airspeed needle pointing to climb speed, the engine hit the red line rpm. After reaching cruise altitude, the propeller increased pitch as the airspeed behaved much like a constant speed prop—except that it is fully automatic.

This is not a two-speed prop; it modulates itself based on the airplane's speed and other dynamic forces. And as if that wasn't good enough, an Aeromatic propeller is a self-contained unit with no controls from the propeller to the cockpit.

It was time to practice some turns and stalls before heading back to the pattern to shoot the traditional three full-stop landings. During the turns, the controls were light, balanced, and effective. Stalls were straightforward, and we mushed down like a big Piper Cub. For a 1930s aircraft, the cruise performance matched most Pipers and Cessnas of the '50s and even today. At 2,200 rpm, it cruised at 120 mph burning 10 gph—and 2 or 3 quarts of oil per hour, standard for a Ranger engine. This provides five hours of endurance.

Lon recommended I use 80 mph for the approach. I selected full flaps; the split flaps, while not too big, are effective in helping to control the speed while increasing the rate of descent. With a touch of the throttle for a stabilized approach, crossing the border of the field, I closed the throttle and started my flare waiting for the rubber to contact the grass and the spring oil shock absorbers to compress. I could barely feel the first contact. I held a little bit more, "flying" the gear instead of just letting it drop, as you do in the Airbus A330 when you "fly" the second set of wheels of the main gear. A perfect greaser, like landing on cotton.

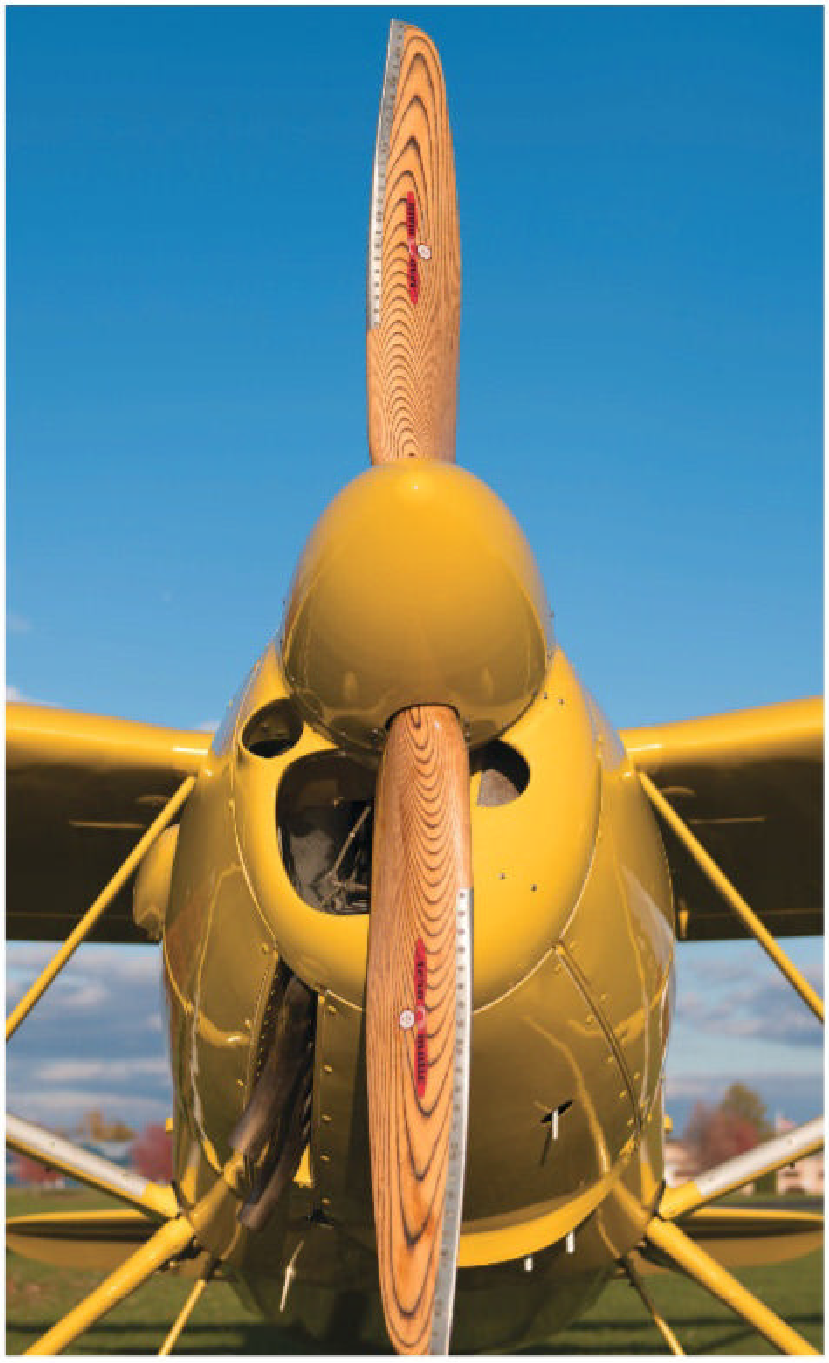
I smiled, and Lon joked with me about whether I would be able to do it again or if it was just beginner's luck.

We went up for a second flight around the pattern, and the same thing happened: another perfect landing, and I was in love with this airplane.

I got cocky on my third landing and lost concentration. I flared too late. A small bounce followed. I quickly applied forward pressure on the stick, pinning the wheels to the grass with the tail up. Even during an imperfect landing, the Fairchild 24 shows predictable and noble characteristics.

That was the last one—we taxied back with some taps on the brakes during the turns. As we shut down, the Aeromatic prop wound down to a full stop, and the smooth Ranger went quiet.

If I ever get a second airplane, the Fairchild 24 will be at the top of the list again, and maybe this time, it will not get away. ●



Above: Dietz with the 'Pegasus,' his green-and-yellow Fairchild 24 that he owns for the second time.

Left: The fully variable-pitch Aeromatic propeller is virtually equivalent to a constant-speed prop. But there the similarities end. The Aeromatic prop needs no governor, cockpit control, or hollow crankshaft. Instead, it is entirely controlled by dynamic pressure, centrifugal force, and air loads.

The author took up the Fairchild 24 for his first flight in the model—and fell quickly in love.

GAMING TO KEEP THE DREAM ALIVE

A private pilot introduces his virtual world and the benefits of flight simulation.

BY SEAN SIFF

I PICKED UP MY FIRST copy of *FLYING* at the Concord Aviation Services FBO in the late 1990s, where I worked part-time to help pay for my flight training. My mom would dutifully drive me to work on the weekends since I began my employment there before I got my driver's license. Concord Municipal Airport (KCON) in New Hampshire was an exciting airport in the summer, busy with general aviation activities, weekend flyers, and the occasional World War II aircraft.

The FBO hosted a good amount of business jet traffic from two NASCAR races at New Hampshire Motor Speedway in nearby Loudon—the highlight each summer. The races brought in the latest Gulfstreams, Challengers, Learjets, and Beechcraft King Airs, with enough aircraft parked wing to wing to fill the runway closed for the occasion.

I quickly learned to love the smell of jet fuel in the morning, working the flight line, cleaning the restrooms, washing the hangar floors, and making the coffee. I had no idea how to make coffee back then, so I can only imagine what the FBO guests thought when they enjoyed a complimentary cup.

With my boss's approval, I would pick up a spare copy of *FLYING* off the coffee table and take it home to read at night. On those pages, I connected with the aspirational world of aviation: sleek business jets, general aviation adventures, and flying wisdom from Collins, Abend, Garrison, Karl, and Lunken. The magazine helped keep my aviation dream alive as I pursued my private pilot certificate.

Many years before my first flight lesson, my grandfather took me to the airport. He flew the F4U Corsair for the U.S. Navy during WWII, and financially supported part of my flight training if I got good grades and wrote him a summary of every flight lesson. I was so fortu-

X-Plane

nate to have his support. I soloed at 16 and planned to finish my private certificate during college, as the one I would attend had a flying club.

Starting my freshman year in September 2001, my world was full of opportunity and optimism. Unfortunately, after 9/11, the college flying club shuttered as CFIs at the nearby airport got laid off—and college life took me in new directions.

Finishing—Finding a Way

Like many of us, the itch to fly never abated, and I completed my private certificate in March 2011, ten years after my first solo. Having been married the year before, I was grateful that my wife supported my dream-chasing ambition to go back to flying again—this time to finish what I started.

In 2012, I took my 88-year-old grandfather for a flight around Concord to celebrate the completion of my certificate. We spent the flight mostly in blissful silence. After some sightseeing, he flew some straight-and-level, made a few smooth and coordinated turns, then handed the controls back to me for a late summer afternoon landing on Runway 35. It was our first and last flight together, but remains a sublime memory I'll hold onto forever.

In 2014, my wife and I started a family and—anticipating that this new phase of life may be disruptive to real-world flying—I began building a modest home simulator paired with *X-Plane 10* software. Over the next year, I acquired the basic equipment, including a gaming PC, a 10-year-old joystick I had in college, some used rudder pedals, and a 5-year-old monitor I had in the basement.

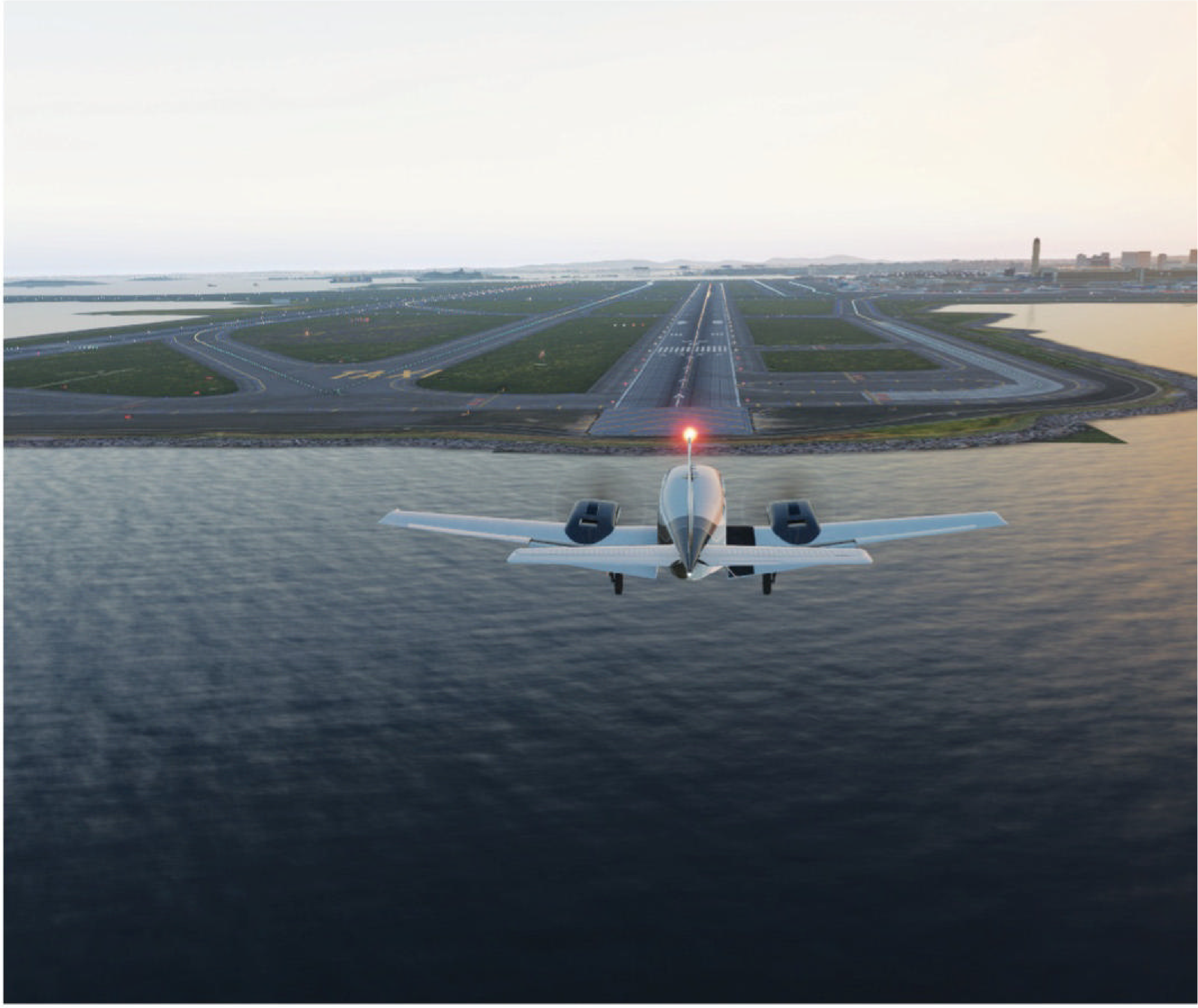
I had not used any flight sim software since using the mid-90s version of *Microsoft Flight Simulator,* so the fidelity of X-Plane 10 amazed me. It definitely lived up to the YouTube reviews.

One of my first sim flights was shooting a practice approach at dusk in VFR conditions at KASH, my home airport at that time. Using my mouse to tune the ILS frequency on the nav/com, the *X-Plane 10* Cessna 172 SP was equipped identically to the one I rented in real life. The warm glow of the panel, the fading light of a digital sunset, and the hum of the engine in my headphones made the experience feel real. The needle movement in the gauges was smooth. The occasional slight flutter caused by the vacuum system faithfully resurfaced in the sim, adding to the feeling of immersion.

I exercised mental checklists, scanned the instruments, and made pitch and power changes to establish and hold a stabilized approach through touchdown. After experiencing the airplane response to my inputs and nailing that first approach, I was swiftly bitten by this particular variant of the flying bug.

Return to MSFS?

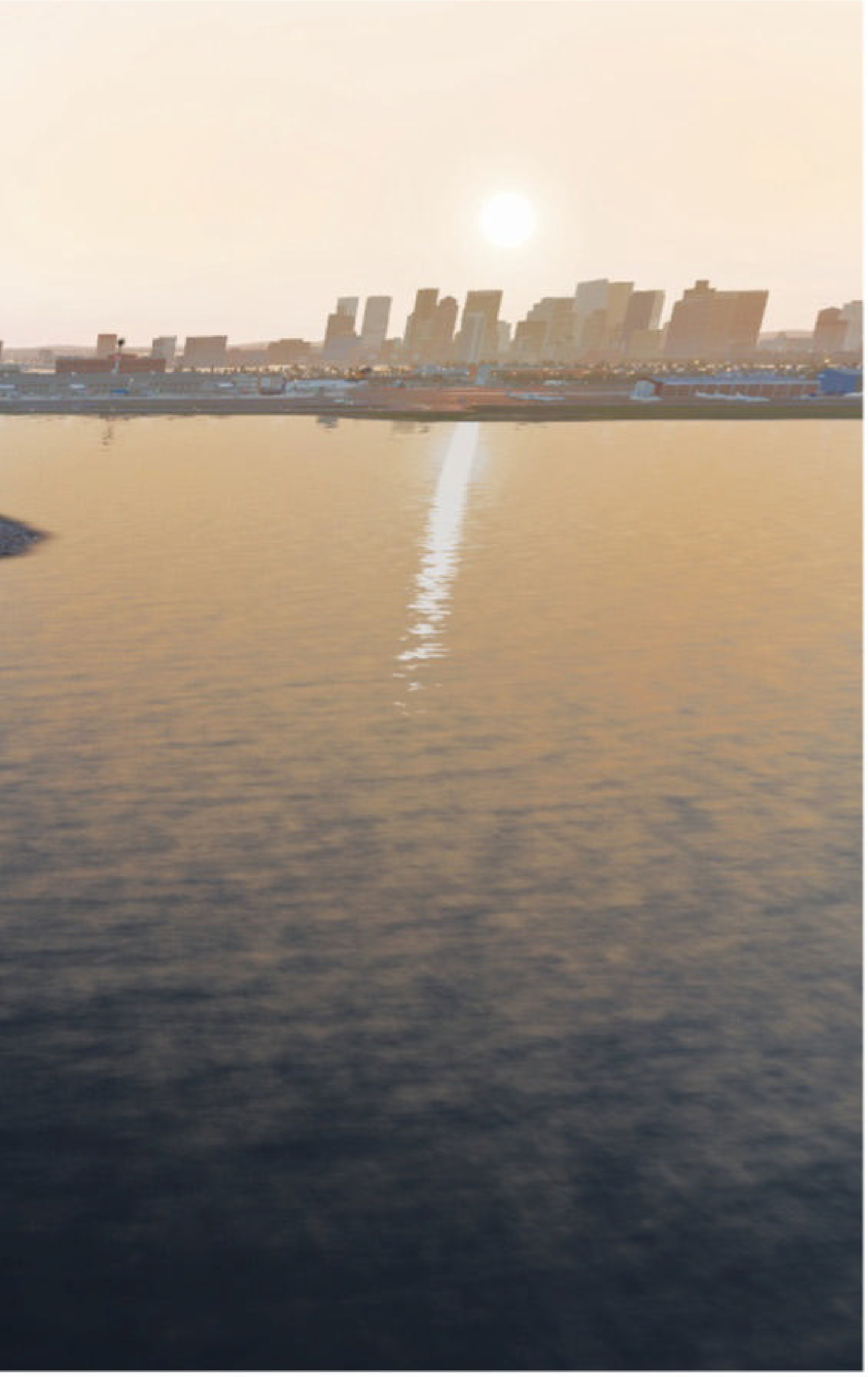
In September 2020, in the midst of the first long year of COVID, Microsoft launched the much-anticipated



return of *Microsoft Flight Simulator 2020* when most of the world quarantined at home. I felt an overwhelming need to reconnect to aviation, and I eagerly unpacked the components of my sim that had been sitting dormant while my family and I relocated to neighboring Massachusetts.

My gaming PC was now six years old, but I could run the minimum settings for *MSFS 2020* and try many of the fun landing activities, which generated a score based on your speed at touchdown, runway location compared to the target and the roll-out distance. The gorgeous simulation features nearly photo-realistic scenery.

In early 2022, I set a goal of bringing my rusty radio work and airspace knowledge back up to speed. To accomplish this, I paired my updated *X-Plane 11* flight sim software with the live air traffic control service called PilotEdge. PilotEdge staffs the service



with real trained air traffic controllers who don't suffer fools—or sim pilots who don't prepare for their flights. As will be covered in future articles, the service also provides a series of challenging scenario-based activities called Communications and Airspace Training (CAT) flights that focus on VFR flying. Being a rusty pilot, I found that I needed to study to pass these flights—and I enjoyed the preparation required.

Often I would begin prepping a few nights before the flight, reviewing the accompanying YouTube video, and writing a flight plan, all in a very similar manner to how I prepared for a real-world flight.

Into the Bravo

The 11th and final flight in the CAT series was a Class Bravo departure from Los Angeles International Airport (KLAX) and a Class B arrival at San Diego International Airport (KSAN). Having never departed or landed at a Class B airport in real life, and conducting the sim flight in an airspace occupied by other real sim pilots, watched over by real live air traffic controllers, I knew this flight would take my full mental effort.

After a busy and tense departure from KLAX and some not-so-perfect radio work, I landed rubber side down at KSAN and made my "clear of Runway 27" call. Within a few moments, the PilotEdge controller told me I had passed the CAT 11. I felt an overwhelming sense of accomplishment. Taxiing to Signature Flight Support in the simulation, I watched as a virtual airline Boeing 737, piloted by another real-world flight sim pilot, received his takeoff clearance and thundered down the runway.

Flying with other live aircraft and the accompanying radio chatter was an experience like no other. Sure, my feet never left terra firma, but my mind was really flying. The prep work to pass the final CAT flight was real, and using the correct phraseology on the radios and working through the three-dimensional problem-solving in real time to navigate the complex airspace of KSAN required my complete attention. The effort was real, even though the flight was virtual.

This is the value proposition provided by having a flight sim in your own home: You can focus on nearly any element of flying that you want to learn or practice and, by doing so, carve back some quality aviation time in your life. My goal has been to fly in my sim once or twice a week, usually starting at 10 p.m. to best minimize distractions.

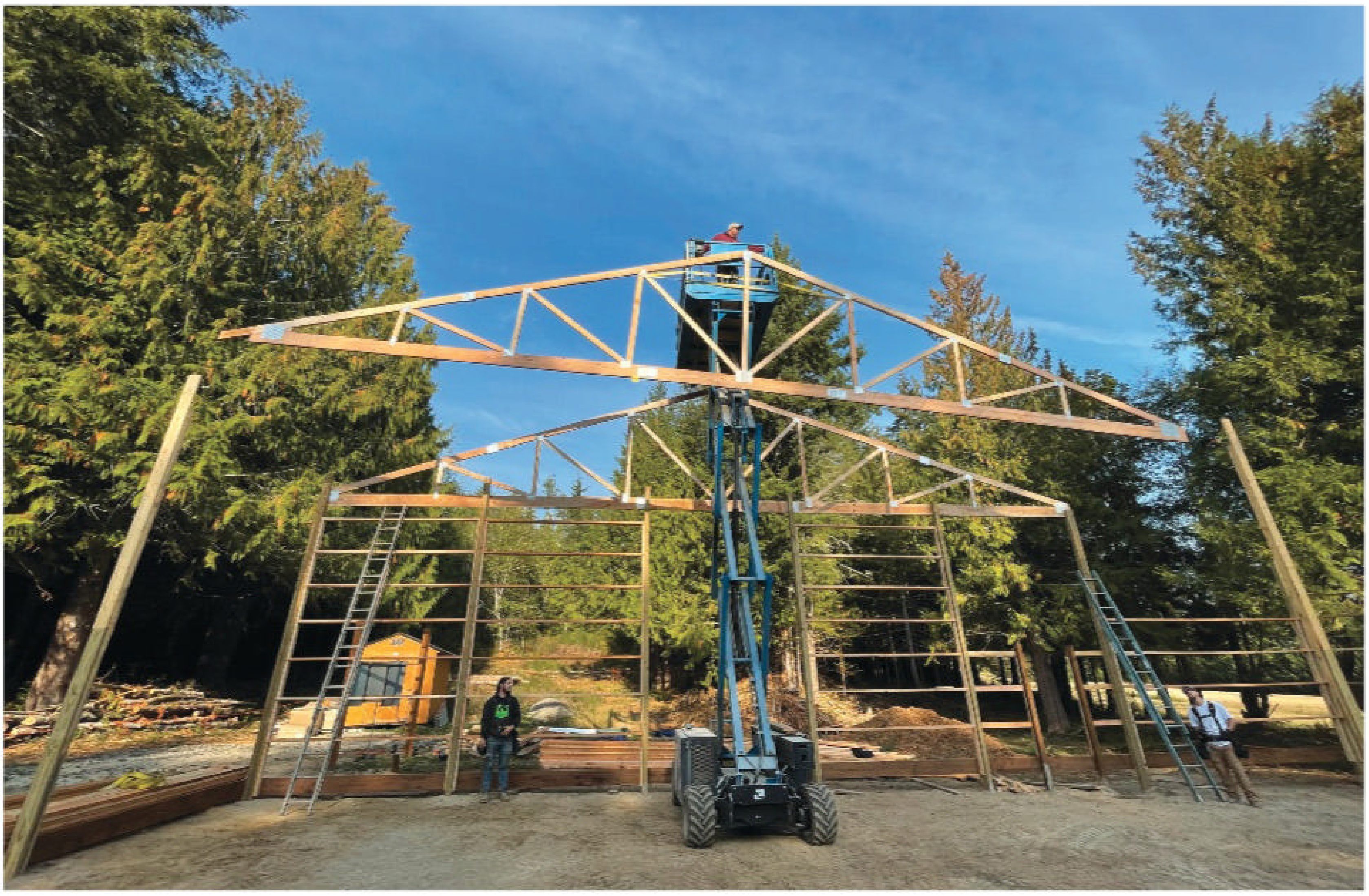
I enjoy scenario-based training flights paired with live air traffic control, but a flight sim can be used simply for fun, exploration, and virtual sightseeing. You can visit almost any airport or enter any airspace in the world, in nearly any weather conditions, and do so in faithfully-recreated versions of hundreds of different airplanes made by enthusiasts or programmers who care about getting the details right. And just like the real airport environment, I've found the people involved in the flight sim community are passionate, welcoming, and genuinely want to help new sim pilots get started.

In future articles, the *FLYING* team will cover some flight sim "watch-outs" to help you avoid developing any bad habits. However, I believe that the upsides to flight simulation far outweigh the potential downsides. I am neither a high-time professional pilot nor particularly tech-savvy, but I believe that my sim will help me become a better pilot when I go back to real-world flying. In the meantime, it helps me keep the dream alive.

If this interests you, I encourage you to go explore the amazing digital world of flight simulation. Perhaps it will grow into a new hobby that helps to keep your own dreams of flying alight. There's never been a better time to get started. ●

SEAN SIFF is a private pilot who has worked in marketing in the aviation industry.

X-Plane (2)



BUILDING THE DREAM, PART 3

A labor of love

BY SAM WEIGEL

THE JANUARY SUN is low in the sky as we bank over Puget Sound, casting long shadows and bathing the icebound Cascades in warm, golden light. As I roll out on a southerly heading, downtown Seattle appears ahead, framed by bustling Lake Union and the distant floating colossus of Mount Rainier. "My goodness, that's beautiful," murmurs my father from the right seat. My mother silently snaps photos of the dramatically-lit cityscape from the Stinson's spacious backseat. I turn to skirt downtown, eyeing the sun's inexorable progress toward the southwestern horizon.

"Sorry guys, time to get back," I announce as I bank towards the Kitsap Peninsula. Hooky is over—time to get back to work. Our scenic tour was a pleasant and well-earned break.

Dad and Mom (Dave and Sue Weigel) are here from Minnesota to help work on our rather delayed hangar/apartment project while my wife Dawn is away on a humanitarian trip to Thailand. I last wrote about the development of our grass-strip aviation homestead six months ago, just before breaking ground. At the time I said, "We should have a good watertight shell by mid-September, and then we plan to finish out the living quarters in October and November. I sincerely hope we are all moved in by Christmas, perhaps even Thanksgiving"

Sam Weigel

(Taking Wing, Buyers Guide 2022). Now I shake my head in bemusement: "Oh, you sweet summer child!" At this point, I shall be ecstatic to move in before July.

I hired local contractors to build the pole barn, pour the slab, and dig the septic system, but I am coordinating the whole thing and finishing out the living quarters myself. This is, admittedly, a poor use of my time from a financial standpoint. It would be much more efficient to pick up overtime flying and leave construction to the pros. But my years of sailing and maintaining *Windbird* in remote tropical locales gave me a sort of ornery DIY ethos that says, "Yeah, I don't know what I'm doing, and I know I'll make mistakes—and I don't care, because I'll learn from them." I regard my active role in the creation of our homestead as a sort of finishing school to acquire some of the more practical skills I missed out on whilst building my flying career. Delays and mistakes are just the price of admission.

The first of these occurred before we even broke ground. Working with an electrician and the power company, I trenched in power and water alongside our driveway, which turned out to be a bit too close to the hangar's left rear to set the corner pole. Some mistakes by the electrician meant it was late August before the trench passed inspection and was backfilled. With the pole barn delayed, the contractor moved on to another job, and we went on the back-burner. In early September, they set the poles, but it was another few weeks before the concrete was delivered and the footings inspected. Framing didn't start until October 5.

We had a fantastically warm and dry autumn, and I hoped we could still get the pole barn dried in before the rains came. The framing started quickly at first. My brother Steve flew out, and we assisted the contractors as they nailed on girts, framed doors and windows, and set trusses the second week of October. The purlins, however, took a ridiculous two weeks as several people on the contractor's small crew quit and others took sick days. I stewed while the framework sat abandoned in perfect construction weather. On days when the contractor's most reliable employee, JD, showed up alone, I donned my carpenter's belt and hopped in the lift with him. Other times Dawn became an unpaid member of the crew—the first time they could recall an owner's wife swinging a hammer. At least the septic people showed up and quickly finished the septic tank and drainfield installation.

In mid-October, Dawn and I installed 2-inch foam board around the perimeter, had fill delivered, rented a skid-steer and plate compactor, and brought the floor level up to grade. I excavated trenches for power, water, and plumbing, and we installed power service conduit from the remote meter base into the hangar. I hired a plumber and helped him rough in the plumbing groundwork. Finally, on November 1, soon after the rains finally started, the contractor installed the roof's steel. Dawn and I spent one frantic week clearing out mud, bringing in more dry fill, compacting it, installing vapor barrier and foam board, and tying in rebar 24 inches on center. That weekend, we installed 3,000 feet of PEX tubing for in-floor heating. Our hard work paid off. On November 18, we had cold but dry weather, and the concrete contractor poured the slab.

Steve flew back out, along with our retired contractor father, in early December. We framed in the living quarters and installed T1-11 siding on the exterior walls, and this went amazingly quickly. Dad and Steve brought Minnesota weather with them as 10 inches of picturesque snow buried the airstrip (and prevented Stinson joyrides), but the lack of rain made for good working weather. I flew the rest of December and early January—and Dawn and I visited Minnesota for Christmas and sailed in the Caribbean over New Year's—but we found time to wire the hangar and annex, and the plumber finished his rough-in.

Now, in late January, Dad has returned, and this time he brought Mom with him. Despite Dad's years in construction, it is Mom's first time working on a job site. She proves immensely useful, and I enjoy working with both of my parents. We finish various framing and electrical odds and ends, trim the exterior in rough-sawn cedar, and install the ductless mini-split heating system. We pass the electrical inspection during their visit and the framing inspection soon after. Meanwhile, the contractors installed the fascia and roof trim and fabricated the gutters and downspouts. Suddenly the hangar is looking a lot like a finished building, at least on the outside.

During my parents' visit, we take delivery of the long-awaited Higher Power hydraulic hangar door, which will be 44 feet by 15 feet when assembled, but is currently a 5,200-pound bundled Erector set. That'll be a major project for early March. I'm hiring pros to do the insulation and drywall, and Dawn and I will pick up the living quarters project in April with paint and flooring. We might finish up in May. I'm not losing sleep over the delays. We're taking each step as it comes, learning a ton, and enjoying the time spent at the airstrip. And giving the Stinson some winter exercise whenever the weather allows.

Such as this clear and cold Sunday, the finest of the winter. The sun has dipped behind the gorgeously backlit Olympic Mountains as we approach the airstrip, plunging the thick forest into gloom. I key the mic seven times and the undulating turf runway is outlined in twinkling white lights. I ease the throttle back and spiral down toward the crease in the forest that denotes the threshold, slip over the final bushes, and flare to a soft landing on the grass. Presently, I turn onto a side taxiway, and a neat wooden hangar appears out of a small clearing. It's just like I imagined it less than a year ago, and now it's reality. There's a lot of work left to accomplish in our labor of love, but this already feels like coming home. ●

SAM WEIGEL began flight lessons at 13 and worked his way up to flying for a major airline. His online series, V1 Rotate, explores the world of the professional pilot.

Courtesy of Ben Younger

OCD AND A&PS

Mechanic criteria

BY BEN YOUNGER

T**HIS PAST JANUARY**, walking up to my fresh-out-of-annual Beechcraft Bonanza in a heated hangar in Moriarty, New Mexico, I immediately noticed something different about my bird. The wing-walk section leading to the door was brand new—black-as-night paint, with a perfect grit. When I dropped her off, the walk had been dirt gray at best and had as much grip as the ice rink at Rockefeller Center.

"Hey, Fernie...what happened here? I didn't ask you to do this."

"I know," he replied.

"So, why'd you do it?"

"Because it was driving me f–king nuts."

This was when I learned that while obsessive-compulsive disorder (OCD) may be a pathology you do not wish in your life partner, consider yourself blessed to find it in your A&P. Fernie Nunez is the owner of New Mexico Aero Services. I met him a few years ago while stuck in New Mexico during the pandemic.

He's a Bonanza specialist who studied under Bob Ripley at one of the American Bonanza Society Maintenance Academy workshops. Incidentally, Bob has been doing my annuals for years, but the trip down to Griffin, Georgia (6A2), is a stretch for me. As I am always on either coast, I decided to make a change that factored heavily on convenience. Ripley is known as Mr. Bonanza and has a waiting list for new customers, so this was no light decision.

While I was stuck, Fernie installed a crankshaft gasket (my third) that managed to seal properly. Finally. I'd seen other mechanics use microwaves and hot water to make the gasket pliable. Some said a prayer. Fernie had a specialized tool and a healthy dose of compulsion. Done and dusted. Another time, in a perfect example of confirmation bias, I told Fernie I had a fuel leak in the cabin as well as fading brakes. Turns out those issues were one and the same, and your faithful author can't discern the smell of 100LL from brake fluid. With the size of my schnoz, this is troubling. Fernie removed the brake master cylinders and rebuilt them both (no co-pilot brakes on my bird). After throwing a few problems like these at Fernie and seeing them thoughtfully solved, I felt comfortable giving him a shot at the annual.

I dropped the airplane off in late December and was about to call an Uber to take me back down the hill to Albuquerque, where I was flying commercial back home for the holidays. Fernie told me he'd be happy to fly me there.

"Didn't know you were a pilot."

"Yup. Commercial, multi, instrument."

"Oh..."

I flew us there in the left seat and watched him taxi out and depart. I had never let anyone fly that airplane. Not with me in it, and certainly not without. Trust is that witches brew of finite data points, mixed with gut feelings and a dice roll.

Fernie stayed in close contact with me over the break. There were things he could not control in this back-ordered, shipping-delayed world we now live in. A throttle cable would take a week. An aux fuel pump rebuild, ten days. In years past, I have had minor squawks that Bob didn't have time to fix during the annual. This is normal. He runs a busy shop.

If it's not a safety-of-flight issue, then I come back and make an appointment later. This is where Fernie's OCD diagnosis can pay dividends. He attacked every squawk I could throw at him. Leaving anything unresolved gives him agita.

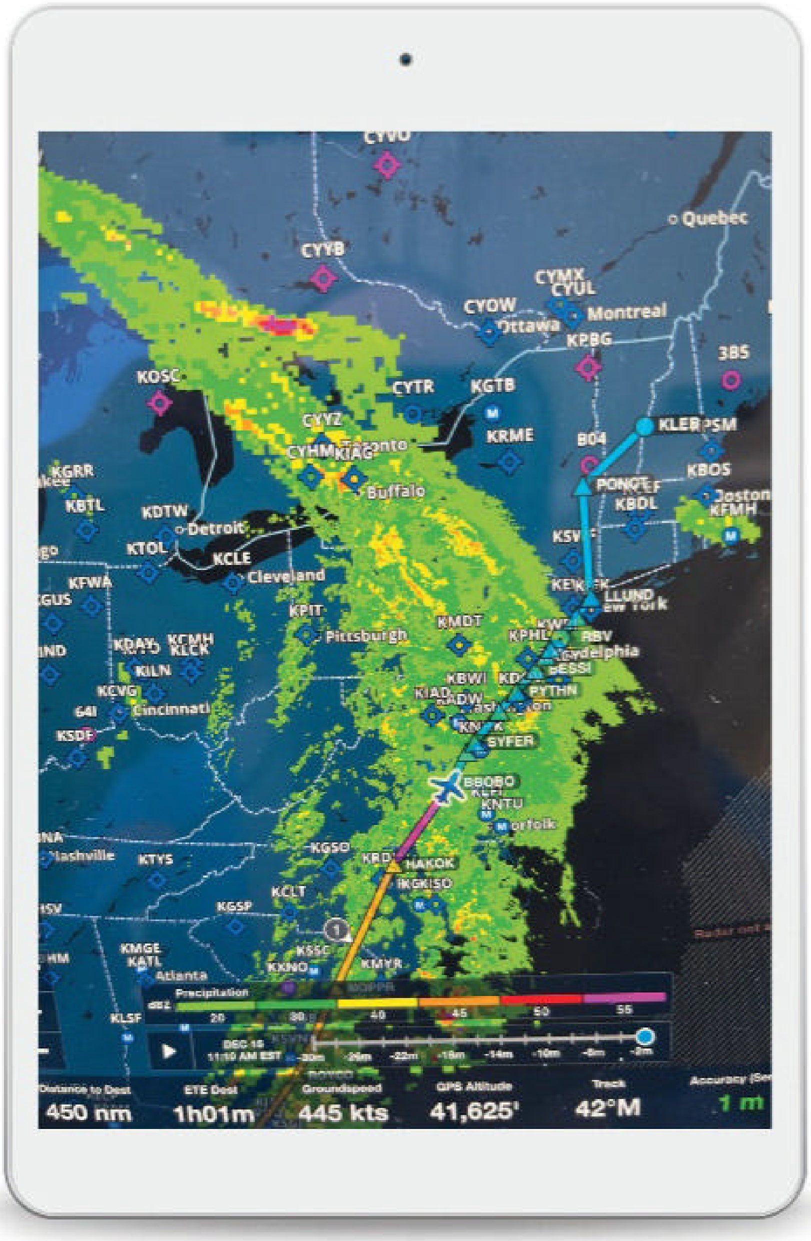
Returning to Moriarty after the holidays, I found Fernie had addressed every single item I had on my exhaustive list. When I arrived in the morning to pick her up, Fernie told me the Bonanza had an additional hour on the tach. He had flown it and tested every system, making sure everything worked as it should. The first flight after an annual is always the most dangerous. Things have been futzed with. The interior has been removed, bolts undone, then re-torqued. My Electroair ignition system was finally installed correctly—the remaining mag firing the top plugs with the Electroair firing the bottoms (it had been backward for some time). The new aux fuel pump whirred loud and true. The landing gear was rigged properly. These are not small things. Fernie's willingness to be the first up after all of this work is confidence-inspiring, to say the least.

But there was also a smile creeping out from the corner of his mouth. The truth is, it doesn't really take an hour to check all these things. He just loved the airplane and wanted to stay up there a bit longer. He had one of his employees, Dustin, with him. They both just love airplanes. Still. The love has not waned, and I believe it finds its way into the work, making mine that much better cared for.

I took a trip this past weekend to KSLC, Salt Lake City International. I had a United flight booked, but a few hours before departing, I checked in online. It was then I was told that my snowboard bag would cost $400 round-trip to make the journey with me. It was 2 inches too long. It was 4:30 p.m. at this point, but I was so annoyed that I canceled the flight, drove straight to Burbank, and fired up my airplane. It was going to be a night flight over mountains. I made sure the route followed Victor airways and filed IFR, but still... What gave me extra courage was knowing Fernie had completed my annual. Following that, I trusted her to get me there, and she did.

Back during the pandemic, there was one issue Fernie could not fix. My new Whelen taxi light kept rotating in the housing, causing the name to turn 15 degrees askew. Mind you, this had zero impact on the pattern, direction, and efficacy of the light. Like my wing walk, it just drove Fernie nuts. It was fixed when I came to pick up the airplane in January. I got a five-minute explanation of how there was no retaining tab, but he had fashioned one himself to seat it permanently in the housing. I was overcome with joy and tried to hug him goodbye, but he wasn't having it. All good. OCD swings both ways. I'll gladly trade a no-cuddle policy for a perfectly-working airplane. All day. Every day. ●

BEN YOUNGER is a TV and film writer/director, avid motorcyclist, and surfer—but it's being a pilot that he treats as a second profession. Follow Ben Younger on Instagram: @thisisbenyounger.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Courtesy of Dick Karl

RETIREMENT FLIGHT?

Insurance woes make for personal misery…and taking stock.

BY DICK KARL

ONE DAY AFTER I flew our Cessna Citation CJ1 from Austin, Texas, to Tampa, Florida, I was deemed incompetent by virtue of age for single-pilot flight by the Brown Insurance Corporation. The jet sat unused for a month while I searched for pilots who would qualify to fly with me under the two-pilot provisions of the new policy. Though the type rating for Cessna 525s is good for all CJs, the insurance carrier demanded currency in make and model. Some pilots with 3,000 hours of CJ3 time were not eligible without “differences training.” I can tell you right now what those differences are: Our airplane is slower!

A long-awaited Christmas holiday vacation with the grandkids in New Hampshire loomed without any hope of flying there. But then, what to my wondering eyes should appear, but my flying buddy, Bill Albert. Some people say you can tell if you have a close friendship by asking yourself, would I ask this person to pick me up at the airport? How about, would I ask this guy to drive a rental car from Orlando to Tampa, fly with me to Lebanon, New Hampshire (KLEB), and take an airline home the next day? Bill and I have flown CJ1s, -2s, and -3s together. He's on *my* insurance policy. He volunteered to help Cathy, me, and our dog Rocco go to New England for the holidays. He is that kind of friend.

Only one problem: a giant weather system featuring heavy rain, high winds, and snow straddled the route. Furthermore, the forecast for Lebanon for the next two days was more blizzard than blue sky. By the time Bill got to Tampa, we had realized that we'd better arrange for him to get back to Orlando that night, or he would be our house guest for the foreseeable future. We found a flight from Lebanon to Boston, Massachusetts, at 1:13 p.m. that same day. If we got the 1,200 nautical miles behind us by 12:30, he might make it.

I had not flown in six weeks. In fact, I hadn't even visited the airplane. Loss of single-pilot insurance meant we were selling the jet. Like a jilted lover, I didn't even want to see her. This airplane that I have loved so was no longer going to be mine. I could not look her in the eye. Bill was a soothing compatriot. In the FBO, we looked at the radar together. Thunderstorms perched just north of Tampa and obstructed our path. We planned to ask for vectors to the east so as to climb to a safe altitude, turn on the ship's radar, and head north, picking our way through.

This was not to be. After takeoff, we were given a heading of 360 degrees and step-climbed to 23,000 feet. Though we were in dark clouds, the radar didn't show much, and our Nexrad information confirmed that the savvy Jacksonville Center controllers were threading us through some light spots. We broke out at 35,000 feet.

Tailwinds materialized as we turned northeast and climbed to flight level 410. Fat, dumb, and happy, we were on top and amused ourselves by listening to the complaining airliners banging it out at FL 350. Speaking of complaints, Bill listened with his sympathetic ear to my whining about losing the airplane of my life. After a good hour of this, I realized I needed to acknowledge how lucky my life has been. I have had a great ride, but this restriction seems unrelated to my experience, abilities, and aviation decision-making capabilities.

Sure enough, our destination was holding up with VFR visibility. When Boston Center turned us over to the KLEB tower, Bill's first words were, "Can you check on the 1:15 Cape Air to Boston for a passenger named Albert?" The tower acknowledged our position, and gave us the visual to Runway 36, but said that he thought the Cape Air flight had already left. Uh oh. On final, the tower said, "Oh, I see it, there is another Boston flight in about 30 minutes." We landed, taxied in, and I dove headfirst into a crew car to get Bill around the field for the Cape Air check-in.

> *There were no balloons, no water cannons, no glowing tributes. I guess that could be true at any time for any of us.*

After unloading Cathy, the luggage, and the dog, we went back around the field to check on Bill. He was getting bored waiting to board. That night, we got 20 inches of snow. The airport was closed for two days. Bill got home by 9 p.m., exhausted, no doubt.

Three weeks later, how were we to get home to Tampa? The answer was the same (thanks, Bill), though the choreography was less propitious. Bill arrived by airline at 1:30 p.m., and by 2:00, we were in the cockpit. The tower said that there were ground stops for flights into Florida. Something about a computer issue at Miami Center and the effect on ERAM (En Route Automation Modernization program). Our EDCT (estimated departure clearance time) was 5 hours hence. We went back to our cottage, turned on the heat and the water, and built a fire in the fireplace.

Next day showed clouds with rain beginning early, so we planned our getaway accordingly. By now, headwinds had ruled out a nonstop to Tampa. We climbed to FL 380 and peeked in and out of clouds. Two and a half hours later, we landed for fuel in Savannah, Georgia (KSAV). During that long, slow leg, we talked about lots of things. I thought of my two friends who had unknowingly flown their retirement flights. One never flew an airliner again because of a medical issue, the other because of COVID.

Refueled, we landed at home base, KVDF, at noon. Bill took an Uber home. As I resettled, I learned that during the preceding six days, two Phenom 300s had crashed. Both had two-pilot crews younger than I am, a fact not lost on me. The next day, a friend pointed out that perhaps the KSAV to KVDF leg had been my retirement flight. There were no balloons, no water cannon, and no glowing tributes. I guess that could be true at any time for any of us. ●

DICK KARL is a cancer surgeon turned Part 135 pilot who flies a Cessna Citation CJ1.

THE LIGHT AIRCRAFT SECTOR SHINES

In 2022, the light sport and kitbuilt markets showed steady sales.

BY DAN JOHNSON

THE YEAR STARTED with hope. As 2022 arrived, the U.S. and most countries were emerging from two years of difficult lockdowns. The good news? A flood of subsidy money buoyed markets—and I've long observed that when equities are rising, light sport and sport pilot-eligible kit aircraft sell well. Economists call this a "wealth effect," where rising asset values give stockholders confidence that good times are here. Aviation translation: Pilots can afford an airplane to have fun.

Jim Barrett

Then…Russia invaded Ukraine and the global markets trembled.

The General Aviation Manufacturers Association released information recently showing positive results for 2022 in every category they report. The closest corollary to light sport aircraft and sport pilot-eligible kitbuilt aircraft is GAMA's "piston airplanes" category, which showed an 8.2 percent gain over 2021.

When we examine only U.S. aircraft information and omit multiengine aircraft, the single-engine piston category shows 1,005 U.S. aircraft deliveries. In comparison, the overall light aircraft market totaled 738 new registrations, or 73 percent of what GA builders delivered. Note that deliveries and registrations may differ in any given year, but tend to converge over time.

Despite a year of war, plunging stock markets and sky-high energy prices, protests and riots in multiple countries, huge increases in freight cost, plus ongoing supply chain challenges and lingering COVID-19 fears, the light aircraft market nonetheless grew by a very healthy 18 percent, as compared to a rising 10 percent in 2021. The industry is now performing better than in 2019, the last year of relative stability before COVID.

Let's Unpack the Numbers

I am using a different approach for analysis this year, partly to give added perspective, given the challenging start to the 2020s. You can get more detail on the Tableau Public market share data by visiting bydanjohnson.com.

Here I cover only aircraft called out in the adjacent table—including light sport aircraft and kitbuilt aircraft a pilot can operate using sport pilot certificate privileges, significantly meaning no medical is required. The data rely 100 percent on FAA registration records, which are then closely reviewed by industry experts. This report offers aircraft registration data current through the end of 2022—professionally analyzed by computer database expert Steve Beste. Category explanations are provided below.

I grouped all the light aircraft data into these categories:

- Combined Results, All Categories, includes fully-built, kitbuilt, ELSA (experimental light sport aircraft), and also portrays how the FAA's 1990s-era primary category touches this segment.

- SLSA (special light sport aircraft) and ELSA are presented as a group because all must ship conforming to the SLSA model first accepted by the FAA. After an ELSA owner takes delivery, that person can make changes without factory approval but then loses the chance to offer compensated flight instruction or rental of their aircraft.

- SLSA Only covers only ready-to-fly aircraft, separate from ELSA. SLSA can be used for compensated operations like flight instruction and rental.

- EAB (experimental-amateur built) and ELSA are shown as a group because in both cases the owner can alter and maintain the aircraft.

- EAB Only separates the ELSA out of the strictly homebuilt segment.

- ELSA are also shown separately, as they can become quite different from the SLSA model in which they began life. An owner can change avionics and interiors, add equipment, or even change the engine.

Two remaining categories include experimental-exhibition, used mostly by Pipistrel for its motorglider models in this context; and the primary category that presently counts only AutoGyro as an OEM. Models that pursued primary category certification back in the 1990s (such as the Quicksilver GT500) have not continued with that approach.

CHANGES IN LIGHT AIRCRAFT CATEGORIES: 2020-2021-2022

CATEGORY TYPE	2020	2021	CHNG	%	2022	CHNG	%
Combined Results, All Categories	567	624	57	10%	738	114	18%
Special and Experimental LSA	219	252	33	15%	307	55	22%
Special LSA Only (SLSA)	159	195	36	23%	225	30	15%
Experimental LSA Only (ELSA)	60	57	-3	-5%	82	25	44%
Experimental Amateur Built and ELSA	403	409	6	1%	494	85	21%
Experimental Amateur Built Only	343	352	9	3%	412	60	17%
Experimental Exhibition and Other	2	11	9	450%	9	-2	-18%
Primary Category (AutoGyro only)	1	2	1	100%	5	3	150%

Which Models Sold Best?

The best-selling model overall came from Van's Aircraft with their RV-12 series (with the original Rotax 912-powered model and the newer version with the Rotax 912iS), which supplied 61 of the best-selling single model of light aircraft in the FAA registry for 2022. Of these, 13 were fully-built SLSA models; the balance of 47 RV-12s were ELSA (plus one more registered as EAB). Most ELSA left the factory essentially complete, as I understand it.

Going the ELSA route has attracted a certain type of buyer interested in fully maintaining or modifying their aircraft. The RV-12 alone accounts for 43 percent of all such aircraft registered in 2022.

In what I term "alternative aircraft" in this sector, powered parachute manufacturer Powrachute accounted for another 15 ELSA, and Wild Sky Goat (a weight-shift aircraft) registered six more. The remaining 18 ELSAs were produced by 12 other producers.

One note reveals the presence of two fully-built Bristell USA aircraft that were registered ELSA to permit IFR operations (yes, that is possible; more on that in future articles in *FLYING*).

The best-selling SLSA (fully-built) comes as no surprise, so I'll skip the suspense and tell you it was ICON's A5, which registered 33 aircraft in 2022 to lead the ready-to-fly pack. In second, fourth, fifth, and sixth places were Tecnam (19 SLSA), Vashon (15), Sling (13), and Super Petrel (11). The third most-registered brand deserves a special mention for 2022. Despite a war in its Ukraine homeland and suffering direct damage from the conflict, Kyiv-based Aeroprakt added 17 aircraft to the FAA registry in 2022. Good U.S. partners help.

One interesting factoid in the database is the 2022 registration of two Cessna 162 Skycatchers. Since the model is long out of production—in fact, all remaining brand-new, partly-finished Skycatchers were chopped up and crushed in 2016, so one wonders how a pair of them were added to the database last year.

The best-selling kit builder is another ongoing winner. Zenith, with 91 registrations, has led the pack almost as long as I've followed these statistics. Zenith has several models, but their Sky Jeep CH-701 and -750 series contribute to the bulk of the company's kit deliveries. Remember, kit sales don't precisely relate to registrations, as owners have to assemble them first. This can take months to years.

Trailing Zenith rather closely are the usual producers: Rans (59 kits; plus 2 SLSA), Sonex (45), Kitfox (38; plus 2 SLSA), and Just Aircraft (30). Right behind is Magni (16) because gyroplanes—other than AutoGyro's primary category models (five registered in 2022)—must be built as kits until the MOSAIC implementation corrects this FAA oversight. AutoGyro also sells kit versions (15 registered). LSA seaplane builder Progressive Aerodyne built Searey kits (10) plus 6 SLSA models.

Among "alternative aircraft" in this space, Powrachute powered parachutes registered 25 aircraft, including 16 kits and 9 SLSA models. In the weight shift category, Evolution Trikes was the leader with 11 registrations, of which seven were SLSA. The company also reports good sales of its non-registered Part 103 aircraft, adding to their total.

The post-COVID period has been kind to the lighter aircraft segment. With some deliveries already quoting into 2024, industry players hope the good news can continue through 2023. ●

DAN JOHNSON is the creator of bydanjohnson.com, in which he focuses on affordable recreational aviation.

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PAPER TRAINING

A legacy airline introduces "Fleet Harmonization" by bulletin.

BY LES ABEND

A**FTER HEARING THE** thwack of the cockpit door, I turned in my seat to see the captain standing frozen in position. He scanned the flight deck with wide eyes and then settled his focus on me in the right seat.

"Did you know that we were flying a 757 on this leg?" the captain asked with a sheepish expression.

"Yessir, it was on the bid sheet." I gestured at the door threshold. "You have to step down in this airplane as opposed to stepping up in the 767," I said with a grin.

The captain nodded an acknowledgment, gingerly walking toward the left seat.

As he slid his flight bag into position, he said, "It's been a while since I read that differences bulletin, so maybe it's best that I fly this leg to Orange County, and you give me guidance."

"Sounds like a plan," I said more confidently than I felt, excited to try on a new pair of wings.

The airline had been flying the Boeing 767 for almost five years before the 757 entered service. Despite having the same type rating, most of us had never even flown the 757 simulator, let alone the actual airplane. A cursory glance in each cockpit didn't reveal much to distinguish the two machines. But there were some subtle and not-so-subtle differences in their systems, notwithstanding gross weights and powerplants. The flight handling characteristics were noticeably different, with the 767 a

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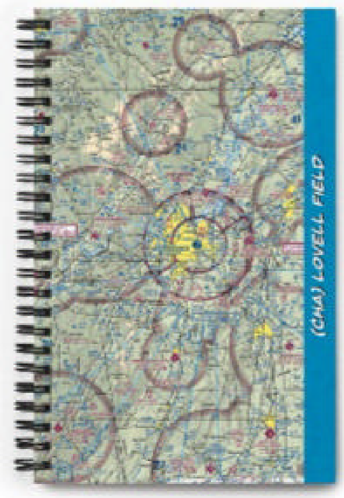
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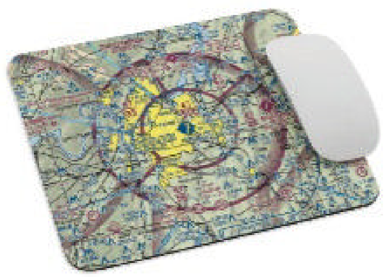

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Cadillac DeVille and the 757 a Chevy Corvette. The captain on that trip performed admirably, especially landing an unfamiliar airplane on a short runway.

Our departure from Orange County (KSNA) the following day included a deadheading McDonnell Douglas MD-80 crew riding in our jumpseats. They became anxious when we openly discussed a handful of unfamiliar items on the 757 checklist. They became quiet when we revealed that our total time on the airplane was about three hours and 30 minutes. They became quieter still when we were cleared for takeoff, and I had to diplomatically state to the captain that the power callout was EPR rather than N1.

Regardless of the dual type rating, our only real training on the 757 was a differences bulletin we received just prior to its introduction into service. Although we weren't ecstatic about the lack of formal training, we reluctantly accepted the situation in the spirit of moving the airline forward during a period of rapid growth. In retrospect, it really wasn't a good idea.

Unfortunately, it would seem history has repeated itself.

Via a 36-page bulletin, American Airlines introduced a significant change to its standard operating procedures (SOPs). No simulator training. No distance (online) learning. Just read the bulletin. The new SOPs encompass a concept called "Fleet Harmonization." While allowing for some differences among aircraft types, the objective is to incorporate a common set of procedures for all phases of flight such that pilots transitioning from one airplane to another are already familiar with the tasks. Considering the many aircraft types in service at American, and the current environment of perpetual transition training, fleet harmonization is a worthy goal.

What tasks are included in this change? Manipulation of flaps and gear. Management of navigation systems and mode control panel operations. Takeoff callouts. Landing callouts. Approach procedures. Category II/III operations. Go-arounds. Pushback operations. PA announcements. Seat belt sign operation. Landing light operation. Overall checklist protocols.

The new SOPs are numerous, representing a significant culture change. Although the Allied Pilots Association (APA) endorses fleet harmonization, its leadership is adamantly opposed to its presentation as a lengthy bulletin. The bulletin was introduced to line pilots on December 5 with an implementation date of January 3. Check airmen—the pilots assigned the task of maintaining the standards of the FAA and the airline—weren't given much advance notice either. As a matter of fact, check airmen weren't offered the opportunity to provide input on the new SOPs. Granted, the bulletin touts the contribution of subject matter experts who no doubt provided detailed evaluations and analysis, but wouldn't it be prudent also to include frontline pilots involved with maintaining standards?

In a letter from the APA president to the vice president of flight—the chief pilot of the airline—it was stressed that, at the very least, distance learning was required under such circumstances as per contractual agreement. Ironically, the bulletin indicates that many of the SOP revisions were done to mitigate risk during vulnerable phases of flight. Wouldn't that worthy goal command a training event that involves more than just a document review?

The bulletin further states that the airplane flight manuals should be consulted as an additional reference, implying that not everything is covered within the 36 pages. Despite the objection of APA, the airline's POI (FAA principal operations inspector) deemed the bulletin satisfactory.

Adding to the confusion was an ambiguous letter sent from upper-level pilot management indicating that the implementation could be integrated by utilizing old procedures with the new procedures on a revenue flight. No pilot would be expected or required to be proficient with the new SOPs. The resources of the Flight Training department, Flight Operations, and domicile chief pilots would provide support in the transition.

Unfortunately, one chief pilot didn't get the proverbial memo. A captain delayed a flight at the gate to brief his crew on the new fleet harmonization SOPs. When the captain declared he wouldn't depart until such time that he was confident in the safety of his flight, the chief pilot obliged him by removing the four-striper from his trip without pay. Although the financial aspect was partially resolved for the revolting captain, the event amplified angst among the troops.

The integration of old and new procedures creates an awkward cockpit and a potential recipe for disaster at critical moments. It's pure speculation, but it will be interesting to read the NTSB report of the runway incursion that occurred on January 13 at KJFK when a Delta Boeing 737 had to reject its takeoff because of an improper crossing of an American Airlines Boeing 777. Were the new SOPs a contributing factor?

On a personal level, this training-by-bulletin strategy is disappointing to me. Among many attributes of the airline that was part of my life for 34 years, I felt a deep sense of pride in belonging to an elite group of aviators selected and trained to high standards. At one point during my tenure, I was responsible for maintaining those standards as a check airman.

It is indeed a balancing act to juggle safety and financial efficiency within a multi-billion-dollar corporation. But with an airline, safety has to be one of the most important products. A well-trained pilot produces that product. In this circumstance, with significant operational changes involved, paper training is not a solution.

This retired pilot and veteran of the airline asks that my alma mater reconsider the training strategy sooner rather than later. ●

LES ABEND is a retired 34-year veteran of American Airlines, attempting to readjust his passion for flying airplanes in the lower flight levels without the assistance of a first officer.

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U.S. AIR FORCE

GAGGLES AND FORMATIONS

There are formations...and then there are Formations.

BY MARTHA LUNKEN

I GUESS I FIRST learned about formation flying when my flight instructor, Larry Whitesell, told a story involving—he thought—his buddy, Vince Wynn, who instructed for a school up the road, Cardinal Flight Training. When they'd spy each other in the practice area, they'd often join up for some formation flying. On this occasion, according to Larry, "I saw the Cardinal's Champ below and in front of me and joined on his right wing. But I lost the big grin on my face when, looking over into the Champ's rear seat, I saw—instead of Vince—an FAA inspector named Dan Wright giving a private pilot check ride. He was something less than happy, and back on the ground, I dutifully reported to the GADO. Dan raised holy hell, and I was abjectly contrite, assuring him it was the first time and would never happen again. He dropped it."

Julie Boatman

It was a different time…

Of course, there are Formations (with the capital letter) and formations, or "gaggles." And there's nothing illegal about a gaggle as long as it's agreed to beforehand by the participants. But, agreed to or not, gaggles of untrained pilots in different aircraft, while fun, can be downright dangerous.

Stick with me for a brief explanation of formal formations of civil aircraft that fly over FAA-waivered events like airshows, sports events, and parades—everything from the Super Bowl to an airshow at your local airport.

The event sponsor applies to the FAA for waivers from the regulations addressing minimum safe altitudes, aerobatic maneuvers, and parachuting over crowds. The pilots who will be flying need to hold current aerobatic competency and/or formation cards issued by organizations sanctioned by the FAA. For example, Formation Flying Inc. (FFI) issues cards to qualified pilots for waivered formation flights in mostly Van's Aircraft RVs, plus some Beeches and Mooneys. Remember the 49-ship formation of RVs over the Kansas City Stadium and 50 of them over EAA AirVenture at Oshkosh last year?

There are also civilian warbird organizations (about 18 signatories) that adhere to standards developed by FAST (which stands for "Formation and Safety Team"). Like the FFI guys, these groups regularly meet, train, and practice standards addressed in their FAST manual, a large, formidable thing based on military procedures.

Note: Warbird demonstrations are usually scheduled for warm-season events, allowing pilots to unzip the tops of their flight suits and show chest hair.

In my FAA days, I monitored lots of waivered airshows, checking the logbooks and paperwork of participating aircraft and the competency cards of the flyers. I knew most of the pilots and appreciated great air bosses like Norm Crabtree. Those preshow briefings always ended with Harold Johnson's admonishment: "Just don't do nuthin' dumb."

Note: always check NOTAMs before flying into an event which may (or may not) be in waivered airspace. If the airshow part operates under a waiver, times are published, and you'll be toast if you blunder in (since I no longer monitor airshows for the FAA).

Legend credits the first funeral flyover to a gaggle of World War I British pilots who flew the mission over the funeral of their deadly foe, "The Red Baron," German ace Manfred von Richthofen, saluting a respected and noble adversary.

The U.S. military adopted the tradition in 1938, when 50 aircraft—with one blank file—flew over the funeral of General Oscar Westover and, by the end of World War II, the missing man formation always included the now-famous pull-up maneuver.

Almost everybody's familiar with funeral gaggles flown over the burial of a pilot friend or a well-known aviator. They require no waiver and are common with groups aviating together to fly-in breakfasts and gatherings like Oshkosh as well as those burials or memorials. And they include highly trained formations of RV-8s and warbirds or loose gaggles of Cubs, Champs, Cessna 172s, Beech Barons, Piper Cherokees, and (OK) Cessna 180s.

I've done a few—the first inadvertently. A good friend, Jim McMahon, died and I went to the funeral mass, but had an FAA assignment north of Cincinnati. So I left early enough to preflight and fire up my Cessna 180. As I flew north of the city over Gate of Heaven Cemetery, there was a cortege of cars stopped at a gravesite. I was certain it was Jim's and looked carefully for the gaggle of his buddies who had planned a flyover. I circled a couple of times over the gravesite as people looked up, waggled my wings, and chandelled up in a departure to the north. The gaggle had gone to the wrong cemetery.

I was still an FAA inspector (not working or maybe on suspension for something or other) when a local warbird group of two AT-6s and a T-28 needed a fourth airplane for an unwaivered Memorial Day flyover. Desperate, they asked me to fly the "slot" position in their four-ship formation, flying an SNJ. I had no formation training, but I was pretty good with the "J," and the "tail-end Charley" position took no great skill (which is why they put me back there). Still rather white-knuckled, I worked to stay precisely where I should be, and everything was going swimmingly until, over the event site, the lead airplane turned on his smoke. I was instantly IFR and just hung on, careful not to deviate from heading and altitude. I don't think it was supposed to work that way.

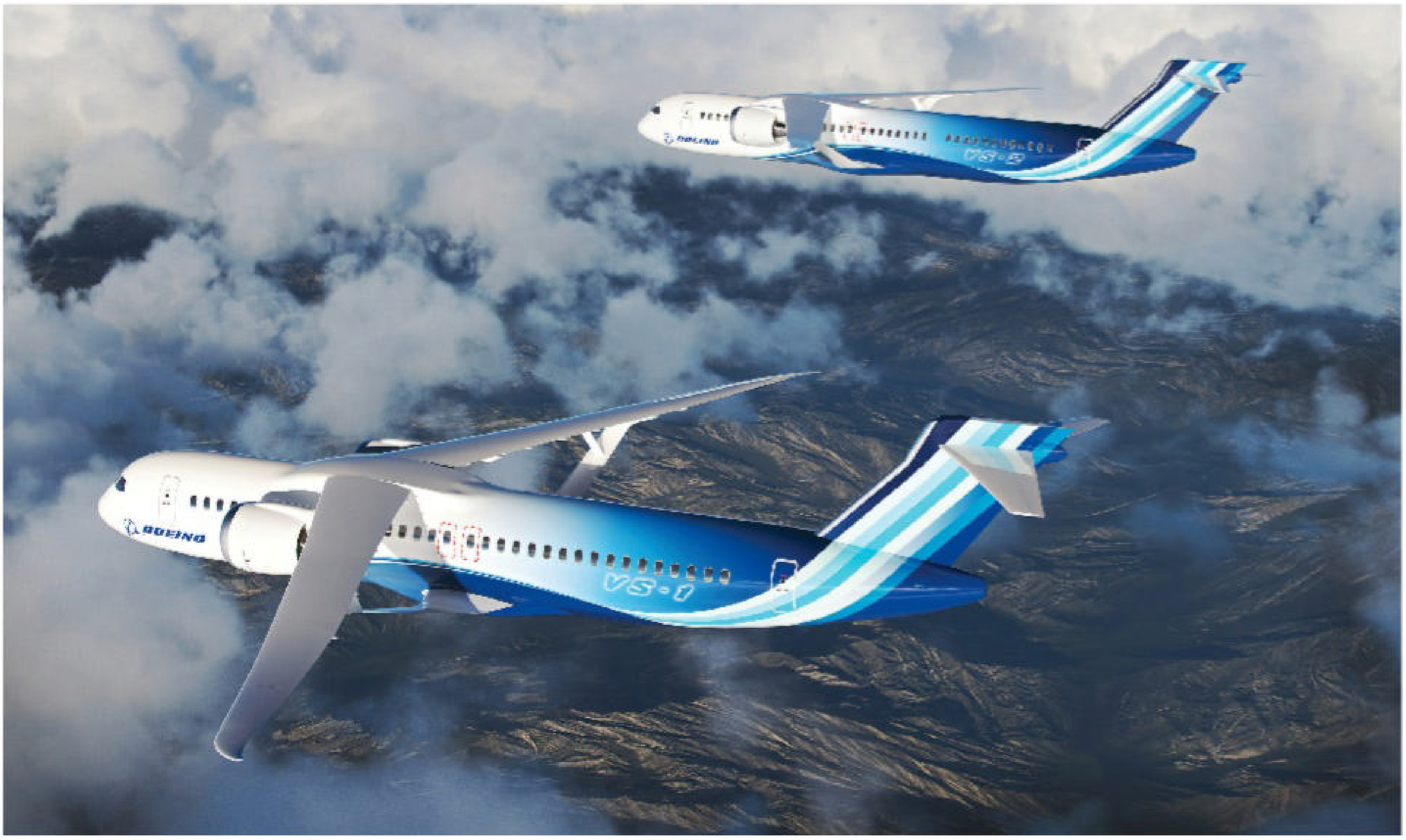
When the FAA used to issue aerobatic competency cards, I was dispatched to watch a demonstration flown by my buddy, Bill Bruns. Sending me to evaluate the skill of a guy like Billy was pretty ludicrous, but I flew my Cub to an airport out east, and after the demonstration, we headed back to Lunken Airport (KLUK) where Bill and I would have lunch. It was a beautiful afternoon, and I was flying blissfully along when something appeared on my right side. It was Billy, flying on my wing, upside down!

And then I agreed to play air boss for a gaggle of Cubs, 172s, Champs, Barons, and WACOs flying over the funeral of a beloved friend, Bill Hogan, at Hamilton, Ohio. When somebody at the cemetery gave me the word via cell phone, I directed the airplanes on a prearranged frequency (those with radios) to launch and keep the airplane ahead in sight. Yeah, I was still with the FAA…

Come to think of it, maybe there's something to a letter that came to *FLYING:*

"How is *FLYING* Magazine not embarrassed by the articles written by Martha Lunken…[who] continues to demonstrate that FAA inspectors are at best loose cannons, and at worst, totally irresponsible pilots and agents of the government." ●

MARTHA LUNKEN is a lifelong pilot, former FAA inspector, and defrocked pilot examiner. She owns and flies a Cessna 180, and she loves anything with a tailwheel, from Piper Cubs to Douglas DC-3s.



THE STRUT RIDES AGAIN

In its next concept aircraft, Boeing floats a classic way to reduce weight.

BY PETER GARRISON

THE CESSNA 120, introduced in 1946, bequeathed its strut-braced wings to nearly all of its successors, making struts and single-engine Cessnas almost synonymous. It wasn't always so. In the 1930s, Cessna built airplanes like the C-34, a clean radial-engine four-seater with a cantilever wing. The demise in 1954 of the C-34's all-metal descendant, the 190/195, left the Cessna universe to strut-braced singles. So things remained until 1967, when cantilever wings appeared more or less simultaneously on the 177 Cardinal and the 210.

Struts and other external bracing were going out of use in fast monoplanes during the 1930s. Round wires generated as much drag as airfoils ten times thicker. So-called "streamline tubing," like that used for under-wing struts, produced more than ten pounds of drag per square foot of frontal area at 100 knots. Since its pre-war designs had cantilever wings, why did Cessna revert to external bracing when it resumed business after the war? The likely answer lies in the interplay of power, weight, and drag.

The high drag of external bracing was never a secret. Fokker and Junkers had already recognized it a decade after Kitty Hawk and were building some cantilever monoplanes during World War I. But if reduced drag was one path to higher performance, reduced weight was another, and external bracing reduced the weight of wings. So long as airplanes didn't go too fast, wings could be skinned with fabric or very light gauge aluminum; the only path to further reducing their weight was to make the spars lighter by adding a

Boeing

strut, which greatly alleviated loads in the otherwise highly-stressed inner portion of the spar.

Weight principally affects takeoff distance and rate of climb, whereas drag affects speed. For any airplane, there is going to be a crossover point at which the overall performance gained from a lighter spar is erased by the losses resulting from a strut.

That may not matter, however, in general aviation at least, because there is an even more important crossover point at which sex appeal outweighs rational design decisions. Cessna evidently reached that point with the 210 in 1967. Its struts looked stodgy compared with the cantilevers of its principal competitors, the Beechcraft Bonanza/Debonair and the Piper Comanche; ergo, the 210 got a new wing, cantilever—and with laminar-flow airfoils to boot. The Cardinal, which was introduced at about the same time, also got a cantilever wing, which it hardly needed because with 150 horsepower it was, although a sweet airplane in many respects, grievously underpowered—a poor climber and quite slow. Logic would have given the Cardinal a strut, but it was intended to be a modern successor to the dowdy 172, and the cantilever wing fairly screamed: “Modern!”

That was more than half a century ago. Today the strut-braced wing is popping up again, this time in a most unlikely place: a proposed Mach 0.8 jet transport.

Theoretical study has been going on for more than a decade to establish the feasibility of greatly reducing the fuel consumption of airliners by increasing the aspect ratio of their wings. The idea isn’t new. In the 1950s, a French firm, Hurel-Dubois, produced strut-braced transports with sailplane-like aspect-ratio-20 wings. Respected aeronautical engineer Werner Pfenninger proposed a transonic airliner on the principle in 1975.

For a given wing loading and speed, induced drag—the drag due to lift—is inversely proportional to the aspect ratio. At the altitudes and speeds at which airliners fly, induced drag can be as much as half of the total drag of the airplane. Thus, doubling the aspect ratio of the wing could, in principle, reduce the total drag and fuel consumption by a quarter.

These elementary facts are not lost on Boeing, Airbus et al. But there’s a hitch. A higher aspect ratio means greater wing root stresses and hence greater structural weight. Current designs, products of decades of computer-aided refinement, already represent optimal compromises between aspect ratio and weight.

Re-enter, with fanfare, the lowly strut.

If you put the fuselage under the wing rather than on top of it and add a Cessna-style strut around mid-span, you can not only greatly reduce the structural weight of the inner part of the wing but also reduce the chord and thickness of the entire wing—both changes reduce drag—and increase its span. In other words, the strut allows you to increase the aspect ratio without a weight penalty, and the induced drag reduction more than pays for the drag of the strut and the various junctions it adds. You can even afford to add a third member, a short “jury strut” running from the main strut to the wing, to further reduce structural weight.

Re-enter, with fanfare, the lowly strut.

In January, NASA contracted with Boeing to build a proof-of-concept airplane called TTBW, for Transonic Truss-Braced Wing. The project, budgeted at over a billion dollars, will mate the somewhat shortened fuselage and the empennage of a McDonnell-Douglas MD-90 to a thin, short-chord wing with half again the span of an equivalent cantilever-wing transport.

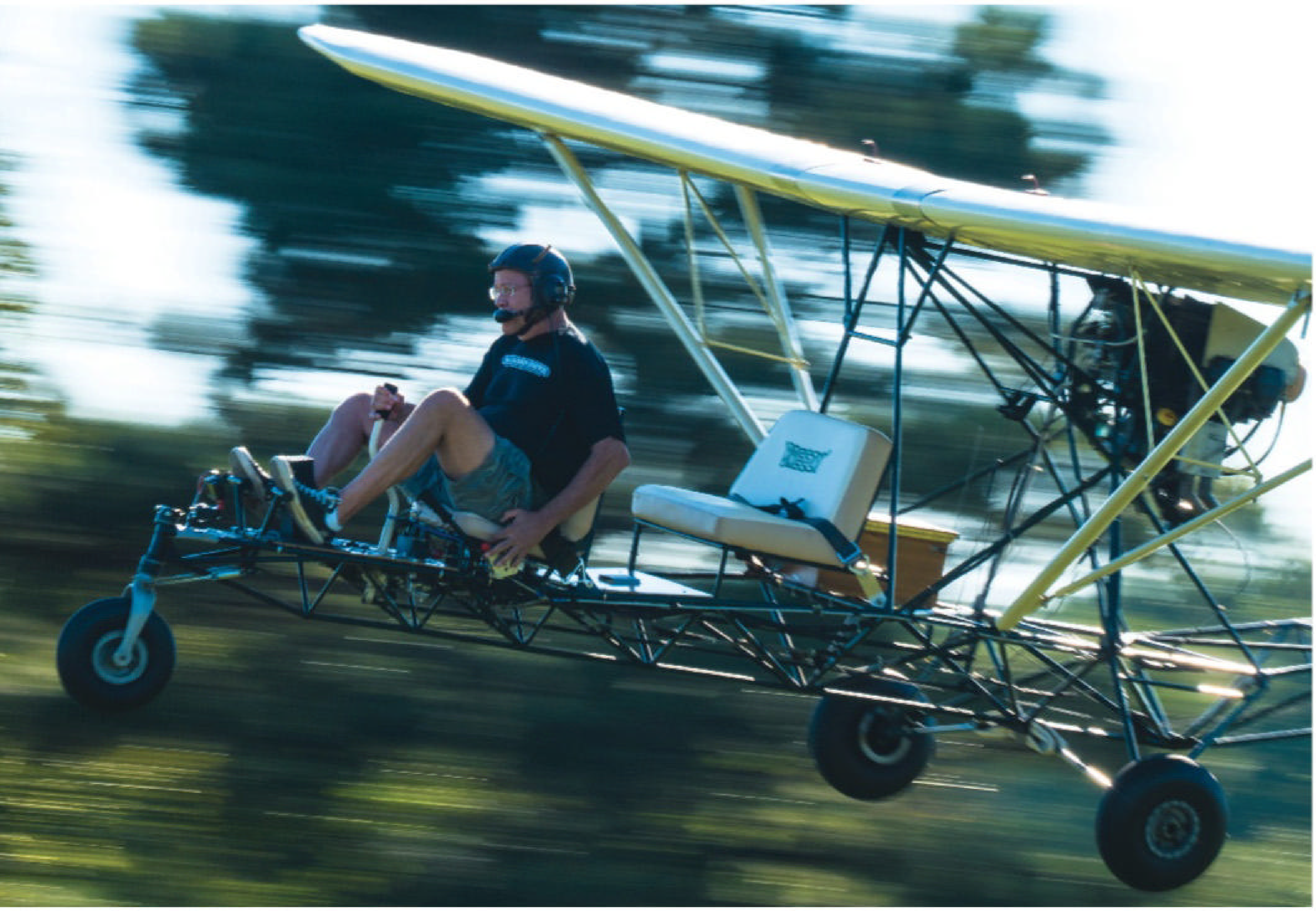
There will be challenges. Elasticity and possibly flutter are liabilities of a very long, thin swept wing; active controls that react instantly to changing flow conditions might be a solution. Diminished fuel volume is another disadvantage; some fuel may have to be carried in the fuselage. Yet another is a lack of space at airports; an airplane of abnormally long span would have to fold its wingtips. (The Boeing 777X has folding tips that reduce its span by 22 feet; the feature is thought to entail a weight penalty of around 3,000 pounds.)

Illustrations accompanying the announcement of the Boeing contract show an MD-90 airframe with a very long, narrow high wing. The high wing provides plenty of ground clearance for big fat engines—good news if it’s a 737 replacement—but no place to mount landing gear. The artist has graciously omitted the bulging pods that will likely be required for that mundane purpose.

Both NASA and airframe manufacturers like to publicize futuristic studies like this from time to time. The last Next Big Thing was the BWB or Blended Wing-Body, which was preceded by Boeing’s improbable Sonic Cruiser, a Mach 0.95 aircraft with a canard strongly resembling the hapless Beech Starship. The cycle reminds me of the “dream cars” that General Motors used to cook up in the 1950s for its annual motoramas.

The interval between a novel conception and actual production is nicknamed the “valley of death.” The phrase comes from a Tennyson poem, “The Charge of the Light Brigade,” about a gallant but suicidal British cavalry charge against overwhelming Russian artillery in the Crimean War in 1854. The Sonic Cruiser quietly expired without flying in any form. The BWB got as far as a large RC model. The TTBW will become a full-scale test article. Let’s see if it fares any better than the Light Brigade. ●

PETER GARRISON taught himself to use a slide rule and tin snips, built an airplane in his backyard, and flew it to Japan. He contributes Aftermath to *FLYING*, along with this well-loved column. He has contributed to *FLYING* since 1968.



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RLU-1 BREEZY

The flying motorcycle lives up to its name.

THE EARLY COVERS of *Popular Aviation, FLYING*'s predecessor, often featured whimsical illustrations depicting the artist's aeronautical dreams—as in the case of this hang glider on the September 1930 issue. In fact, it resembles the Leonard dual-place glider advertised in its pages for flight instruction. But when we flash forward nearly 100 years, we find similar lines in the RLU-1 Breezy kitbuilt airplane famous for its open architecture. Pilots of this readily recognizable bird report feeling like "flying a motorcycle" in the original version, first built in 1964. *FLYING* shared a photo of Paul Poberezny, founder of the Experimental Aircraft Association, taking a passenger for a ride in the October 1974 edition. The Breezy flying on this page is powered by a 90 hp Continental engine and has a range of roughly 120 nm—and it was built from plans with a misprint, leaving the tail too low and outside of the prop wash.

Leonardo Correa Luna

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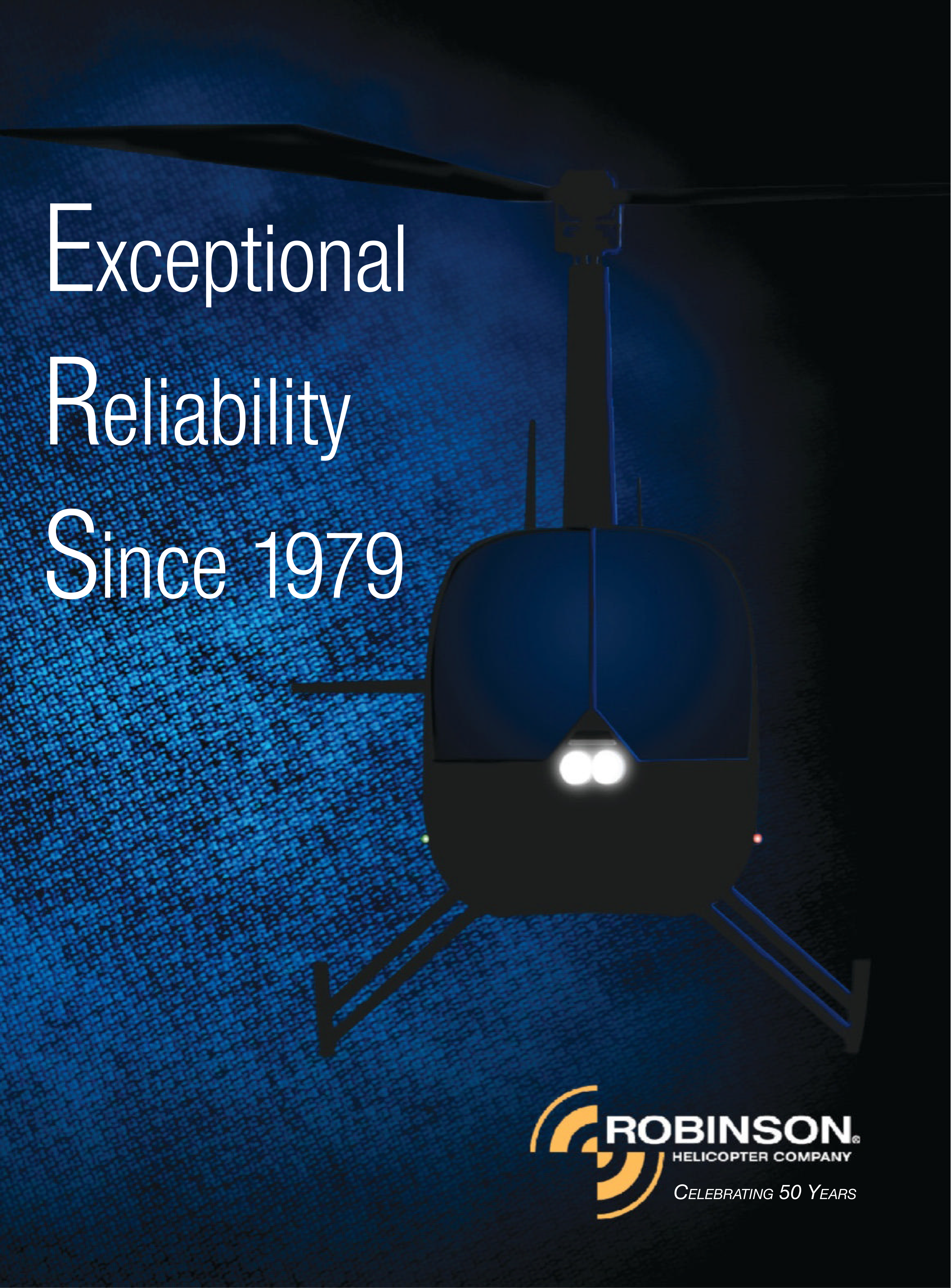
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